



Department Name: Chemical Engineering Department

Faculty Name: Nasser Zouli

2019-2020	
<b>Paper Title</b>	A Systematic Framework for Optimizing a Sweeping Gas Membrane Distillation (SGMD)
<b>Journal Name</b>	Membranes
<b>Link of the paper</b>	<a href="https://www.mdpi.com/2077-0375/10/10/254">https://www.mdpi.com/2077-0375/10/10/254</a>
<b>Abstract</b>	<p>The present work has undertaken a meticulous glance on optimizing the performance of an SGMD configuration utilized a porous poly (vinylidene fluoride-co-hexafluoropropylene) (PVDF-co-HFP) membrane. This was carried out by conducting a systematic framework for investigating and optimizing the pertinent parameters such as sweeping gas flow rate, feed temperature, feed concentration and feed flow rate on the permeate flux. For this purpose, the Taguchi method and design of experiment techniques were harnessed to statistically determine optimum operational conditions. Besides that, a comprehensive surface and permeation characterization was conducted against the hand-made membranes. Results showcased that the membrane performance was ultimately controlled by the feed temperature and was nearly (~680) % higher when the temperature raised from 45 to 65 °C. Also, to a lesser extent, the system was dominated by the feed flow rate. As the adopted feed flow rate increases (from 0.2 to 0.6 L/min), around 47.5% increment was bestowed on water permeability characteristics. In contra,</p>



	34.5% flux decline was witnessed when higher saline feed concentration (100 g/L) was utilized. In the meantime, with raising the sweeping gas flow rate (from 120 to 300 L/h), the distillate was nearly 129% higher. Based on Taguchi design, the maximum permeate flux (17.3 and 17 kg/m <sup>2</sup> ·h) was secured at 35 g/L, 0.4 L/min, 65 °C and 300 L/h, for both commercial and prepared membranes, respectively
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2019-2020	
<b>Paper Title</b>	Fe <sub>3</sub> O <sub>4</sub> nanoparticles decorated multi-walled carbon nanotubes based magnetic nanofluid for heat transfer application
<b>Journal Name</b>	Materials Letters
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0167577X20307485">https://www.sciencedirect.com/science/article/abs/pii/S0167577X20307485</a>
<b>Abstract</b>	The synthesis of magnetic multi-walled carbon nanotubes (MWCNTs)-iron oxide (Fe <sub>3</sub> O <sub>4</sub> ) nanocomposite (NC) provides many interesting traits in individual moieties unfolding new opportunities for a wide range of applications. Several preparation techniques have been employed in the recent past to synthesize MWCNTs-Fe <sub>3</sub> O <sub>4</sub> NCs. Herein, we report the synthesis of Fe <sub>3</sub> O <sub>4</sub> nanoparticles (NPs) decorated MWCNTs NC for heat transfer application. The NC was synthesized via co-precipitation method with a high-quality yield. The magnetic characterization of the as-synthesized NC exhibited saturation magnetization and was found to be 34.86 emu/g. Finally, magnetic nanofluids were prepared by dispersing different amounts of the as-synthesized NC into mineral



	oil, which is rarely reported. A ~50% enhancement in the thermal conductivity of the magnetic nanofluid was observed with loading of ~0.5 g/L of NC, which is better than the results reported so far for various nanofluids
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2019-2020	
<b>Paper Title</b>	Uranium (VI) ions uptake from liquid wastes by solanum incanum leaves: biosorption, desorption and recovery
<b>Journal Name</b>	Alexandria Engineering Journal
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S1110016820301125">https://www.sciencedirect.com/science/article/pii/S1110016820301125</a>
<b>Abstract</b>	Nuclear energy and its technologies can be used in several fields besides generating electricity, such as agriculture, food, medicine, space exploration and desalination [1]. Besides the great benefit in the fields of nuclear technology, it produces radioactive waste that harms all environmental life and it is restricted by government agencies to protect human health and the environment [2], [3], [4]. Radioactive waste varies according to its radioactivity, as short, medium and high radioactivity, short radioactive wastes are subjected to treatment and then discharged into the environment [5], [6]. This treatment carried out by placing these wastes in glass containers until their radioactivity is lowered. For medium and high radioactive wastes, disposal requires stricter measures and storage in geological layers. Despite the high cost-effectiveness of nuclear energy in providing electricity, the danger of radioactive materials and the difficulty of disposing of nuclear waste, this requires relying on non-polluting energy alternatives, such as solar, wind, hydro, geothermal, etc. [7], [8].



	<p>Uranium is an imperative constituent in nuclear fuel manufacturing and also, is the main element of radioactive waste that needs to remove before disposal. There are specialized processes in the treatment of liquid radioactive wastes such as evaporation, precipitation, extraction, and adsorption [9], [10], [11], [12]. In low influent concentrations of radioactive elements, adsorption is an effective process in the removal and recovery of radioactive elements from the liquid phase [13]. There are many adsorbents used in the adsorption process, such as activated carbon, agriculture byproducts, polymers, biomass and nano-materials [14], [15], [16], [17], [18], [19], [20], [21], [22]. The selection of adsorbents used in the adsorption process depends on their effectiveness and also on the possibility of reducing their volume after saturated with pollutants so that it can be easily disposed of using the burial process. <i>Solanum incanum</i> is a plant grows naturally in southern Saudi Arabia and has some uses in leather tanning. Economically, this plant has medicinal properties in reducing the risk of high blood pressure and stroke and heart disease. Also, leaves and stems are useful as green compost. The aim of this work is the use of <i>solanum incanum</i> leaves (SNL) as a new biodegradation agriculture material to remove and recover U (VI) from the liquid wastes in a batch system. Biosorption operating parameters, isotherms and kinetics were studied. Also, the reusability of SNL and recovery of U (VI) were investigated.</p>
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2020-2021	
Paper Title	One-pot preparation of CdO/ZnO core/shell nanofibers: An efficient photocatalyst



<b>Journal Name</b>	Alexandria Engineering Journal
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S111001682030613X">https://www.sciencedirect.com/science/article/pii/S111001682030613X</a>
<b>Abstract</b>	Herein, CdO/ZnO core/shell nanofibers (NFs) were fabricated by one-pot electrospinning technique from a solution composed of poly(vinyl alcohol), zinc acetate dihydrate, and cadmium acetate dihydrate. CdO/ZnO core/shell NFs exhibits an excellent photo-degradation of methylene blue (MB) under sunlight irradiation compared to pristine ZnO NFs. As 98.4% and 42.4% of MB dye was de-colored during 210 min using CdO/ZnO core/shell NFs and pristine ZnO NFs, respectively. The photo-degradation reaction of MB with CdO/ZnO core/shell NFs followed the pseudo-first-order relation.

2020-2021	
<b>Paper Title</b>	Performance Evaluation of Polyethersulfone Membranes for Competitive Removal of Cd <sup>2+</sup> , Co <sup>2+</sup> , and Pb <sup>2+</sup> Ions from Simulated Groundwater
<b>Journal Name</b>	Geofluids
<b>Link of the paper</b>	<a href="https://www.hindawi.com/journals/geofluids/2021/6654477/">https://www.hindawi.com/journals/geofluids/2021/6654477/</a>
<b>Abstract</b>	This paper presents studying the performance of three types of polyethersulfone (PES) membrane for the simultaneous removal of Co <sup>2+</sup> ions, Cd <sup>2+</sup> ions, and Pb <sup>2+</sup> ions from binary and ternary aqueous solutions. Co <sup>2+</sup> ions, Cd <sup>2+</sup> ions, and Pb <sup>2+</sup> ions with two different initial concentrations (e.g., 10 and 50 ppm) were selected as examples



	<p>of heavy metals that contaminate the groundwater as a result of geological and human activities. This study investigated the effect of types of PES membrane and metal ions concentration on the separation process. For the binary aqueous solutions, the permeation flux of the PES2 membranes was higher for the separation process of solutions containing 50 ppm of <math>\text{Cd}^{2+}</math> ions and 10 ppm of <math>\text{Co}^{2+}</math> ions (<math>24.7 \text{ L/m}^2 \cdot \text{h}</math>) and <math>\text{Pb}^{2+}</math> ions (<math>23.7 \text{ L/m}^2 \cdot \text{h}</math>). All the metals in the binary solutions had high rejection when their initial concentration was lower than the initial concentration of the other metal present in the same solution. Using PES2, the maximum rejection of <math>\text{Cd}^{2+}</math> ions was 61.3% when the initial concentrations were 50 ppm <math>\text{Pb}^{2+}</math> ions: 10 ppm <math>\text{Cd}^{2+}</math> ions and 55.4% for <math>\text{Pb}^{2+}</math> ions when the initial concentrations were 10 ppm <math>\text{Pb}^{2+}</math> ions: 50 ppm <math>\text{Cd}^{2+}</math> ions. For the ternary aqueous solutions, the rejection and the permeation flux of the PES membranes increased with decreasing the heavy metal initial concentration. Using PES2, the maximum permeation flux was <math>21.6 \text{ L/m}^2 \cdot \text{h}</math> when the initial concentration of the metals was 10 ppm; and the maximum rejection of the metals obtained at initial concentration of 10 ppm was 50.5% for <math>\text{Co}^{2+}</math> ions, 48.3% for <math>\text{Cd}^{2+}</math> ions, and 40% for <math>\text{Pb}^{2+}</math> ions. The results of the filtration process using PES2 of simulated contaminated-groundwater indicated the efficient treatment of groundwater containing <math>\text{Co}^{2+}</math>, <math>\text{Cd}^{2+}</math>, and <math>\text{Pb}^{2+}</math> ions</p>
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2020-2021	
<b>Paper Title</b>	Development and validation of a mathematical model to predict the thermal behaviour of nanofluids
<b>Journal Name</b>	Heat and Mass transfer



Link of the paper	<a href="https://link.springer.com/article/10.1007/s00231-020-02927-5">https://link.springer.com/article/10.1007/s00231-020-02927-5</a>
Abstract	<p>With a single-phase approach, a 3D mathematical model was developed through Computational Fluid Dynamics (CFD) techniques, coupling the momentum and heat transfer balances for the study of the thermal behaviour of nanofluids. The local heat transfer coefficient and thermal boundary layer thickness of CuO/water, Fe<sub>2</sub>O<sub>3</sub>/water and Al<sub>2</sub>O<sub>3</sub>/water nanofluids, have been predicted and compared with those experimentally determined at three volume concentration of nanoparticles (<math>\phi=0.01\%</math>, <math>0.03\%</math> and <math>0.05\%</math>), at <math>T = 25\text{ }^{\circ}\text{C}</math> and <math>T = 55\text{ }^{\circ}\text{C}</math> for laminar and turbulent flow conditions, using a newly developed sophisticated noninvasive heat transfer coefficient probe that is flush mounted on the inner wall of the test section. Such conditions have been used for the mathematical model, considering the effects of the nanoparticle materials and volume concentrations through effective thermophysical properties. The predicted results from the mathematical model show a good agreement with the trend and the experimental observations. The enhancement of the heat transfer coefficient and reduction of the thermal boundary layer when increasing the volume concentration of the nanofluids and when increasing the flow rates have been properly predicted by the mathematical model results, showing average absolute relative errors between <math>1.7\%</math> and <math>8.4\%</math>. The model exhibits an enhancement in the agreement between the experimental measurements and the predicted results when comparing with other models found in literature.</p>

2020-2021	
<b>Paper Title</b>	Carbon-coated Fe <sub>3</sub> O <sub>4</sub> core-shell super-paramagnetic nanoparticle-based ferrofluid for heat transfer applications
<b>Journal Name</b>	Journal of Colloid and Interface Science
<b>Link of the paper</b>	<a href="https://pubs.rsc.org/en/content/articlelanding/2021/na/d1na00061f#!divAbstract">https://pubs.rsc.org/en/content/articlelanding/2021/na/d1na00061f#!divAbstract</a>
<b>Abstract</b>	<p>Herein, we report the investigation of the electrical and thermal conductivity of Fe<sub>3</sub>O<sub>4</sub> and Fe<sub>3</sub>O<sub>4</sub>@carbon (Fe<sub>3</sub>O<sub>4</sub>@C) core-shell nanoparticle (NP)-based ferrofluids. Different sized Fe<sub>3</sub>O<sub>4</sub> NPs were synthesized <i>via</i> a chemical co-precipitation method followed by carbon coating as a shell over the Fe<sub>3</sub>O<sub>4</sub> NPs <i>via</i> the hydrothermal technique. The average particle size of Fe<sub>3</sub>O<sub>4</sub> NPs and Fe<sub>3</sub>O<sub>4</sub>@C core-shell NPs was found to be in the range of ~5–25 nm and ~7–28 nm, respectively. The thickness of the carbon shell over the Fe<sub>3</sub>O<sub>4</sub> NPs was found to be in the range of ~1–3 nm. The magnetic characterization revealed that the as-synthesized small average-sized Fe<sub>3</sub>O<sub>4</sub> NPs (<i>ca.</i> 5 nm) and Fe<sub>3</sub>O<sub>4</sub>@C core-shell NPs (<i>ca.</i> 7 nm) were superparamagnetic in nature. The electrical and thermal conductivities of Fe<sub>3</sub>O<sub>4</sub> NPs and Fe<sub>3</sub>O<sub>4</sub>@C core-shell NP-based ferrofluids were measured using different concentrations of NPs and with different sized NPs. Exceptional results were obtained, where the electrical conductivity was enhanced up to ~3222% and ~2015% for Fe<sub>3</sub>O<sub>4</sub> (<i>ca.</i> 5 nm) and Fe<sub>3</sub>O<sub>4</sub>@C core-shell (<i>ca.</i> 7 nm) NP-based ferrofluids compared to the base fluid, respectively. Similarly, an enhancement in the thermal conductivity of ~153% and ~116% was recorded for Fe<sub>3</sub>O<sub>4</sub> (<i>ca.</i> 5 nm) and Fe<sub>3</sub>O<sub>4</sub>@C core-shell (<i>ca.</i> 7 nm) NPs, respectively. The exceptional enhancement in the thermal conductivity of the bare Fe<sub>3</sub>O<sub>4</sub> NP-based ferrofluid compared to that of the Fe<sub>3</sub>O<sub>4</sub>@C core-shell NP-based ferrofluid was due to the more pronounced</p>

	effect of the chain-like network formation/clustering of bare $\text{Fe}_3\text{O}_4$ NPs in the base fluid. Finally, the experimental thermal conductivity results were compared and validated against the Maxwell effective model. These results were found to be better than results reported till date using either the same or different material systems.
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2020-2021	
<b>Paper Title</b>	Graphitic nanofibers supported NiMn bimetallic nanoalloys as catalysts for H <sub>2</sub> generation from ammonia borane
<b>Journal Name</b>	International Journal of Hydrogen Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0360319921032511">https://www.sciencedirect.com/science/article/abs/pii/S0360319921032511</a>
<b>Abstract</b>	Bimetallic nickel manganese nanoalloy-decorated graphitic <u>nanofibers</u> were prepared using electrospinning. The introduced catalysts were explored as an effective and inexpensive catalyst for H <sub>2</sub> generation from <u>ammonia borane</u> using hydrolysis. Standard techniques were used to determine the morphology and chemical composition of the nanofibers. Characterization indicated successful formation of bimetallic nickel-manganese-decorated graphitic nanofibers. Introduced effective catalysts showed a high <u>reusability</u> for H <sub>2</sub> generation using ammonia borane hydrolysis at low concentrations and temperatures. All formations of the introduced catalysts demonstrated a higher <u>catalytic activity</u> in H <sub>2</sub> generation than nickel-decorated <u>carbon nanofibers</u> . Samples composed of 55 wt%



	nickel and 45 wt% manganese showed the best catalytic activity compared with other formulations. Initial <u>turnover frequency</u> (TOF) of this sample was $58.2 \text{ min}^{-1}$ , twice the TOF of the manganese-free catalyst. Kinetics and thermodynamics revealed that the catalyst concentration followed the pseudo-first order reaction while the ammonia borane concentration follow the pseudo-zero order reaction, providing <u>activation energy</u> of $38.9 \text{ kJ mol}^{-1}$ .
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2020-2021	
<b>Paper Title</b>	Insights on the role of supporting electrospun carbon nanofibers with binary metallic carbides for enhancing their capacitive deionization performance
<b>Journal Name</b>	Journal of Materials Research and Technology
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S2238785421011170">https://www.sciencedirect.com/science/article/pii/S2238785421011170</a>
<b>Abstract</b>	Recent development in desalination technology can be progressed in terms of fabricated <u>nanomaterials</u> and operating parameters, as one among energy-storing systems including fuel cells, capacitors, batteries, and so on. Regarding the examined nanomaterials, embedded $\text{CoCr}_7\text{C}_3$ nanoparticles onto carbon nanofibers ( $\text{CoCr}_7\text{C}_3\text{@CNFs}$ ) were prepared using a facile electrospinning technique. Characterization techniques, such as XRD, FESEM, TEM, <u>HRTEM</u> , STEM, and EDX, were served to define the crystallinity, morphology and chemical composition of the synthesized nanofibers. XRD chart demonstrated the formation of $\text{Cr}_7\text{C}_3$ species



	<p>along with deposited metallic cobalt in this nanomaterial. The morphological study revealed the uniform distribution of metallic cobalt and <math>\text{Cr}_7\text{C}_3</math> nanoparticles onto the fibrous CNFs structure. The electrochemical performance of <math>\text{CoCr}_7\text{C}_3@\text{CNFs}</math> was studied in 1.0 M NaCl solution at <math>5 \text{ mV s}^{-1}</math> to record a specific capacitance of <math>250 \text{ F g}^{-1}</math>. <u>Electrochemical impedance spectroscopy</u> measurements indicated better <u>electron transfer</u> properties after introducing <math>\text{CoCr}_7\text{C}_3</math> to the CNFs structure. Furthermore, its outstanding electrosorption capacity of <math>20.40 \text{ mg g}^{-1}</math> might encourage the preparation of additional nanocomposites for future capacitive deionization (CDI) technology.</p>
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2020-2021	
<b>Paper Title</b>	Insights on the role of supporting electrospun carbon nanofibers with binary metallic carbides for enhancing their capacitive deionization performance
<b>Journal Name</b>	Journal of Materials Research and Technology
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S2238785421011170">https://www.sciencedirect.com/science/article/pii/S2238785421011170</a>
<b>Abstract</b>	Recent development in desalination technology can be progressed in terms of fabricated <u>nanomaterials</u> and operating parameters, as one among energy-storing systems including fuel cells, capacitors, batteries, and so on.



Regarding the examined nanomaterials, embedded  $\text{CoCr}_7\text{C}_3$  nanoparticles onto carbon nanofibers ( $\text{CoCr}_7\text{C}_3@\text{CNFs}$ ) were prepared using a facile electrospinning technique. Characterization techniques, such as XRD, FESEM, TEM, HRTEM, STEM, and EDX, were served to define the crystallinity, morphology and chemical composition of the synthesized nanofibers. XRD chart demonstrated the formation of  $\text{Cr}_7\text{C}_3$  species along with deposited metallic cobalt in this nanomaterial. The morphological study revealed the uniform distribution of metallic cobalt and  $\text{Cr}_7\text{C}_3$  nanoparticles onto the fibrous CNFs structure. The electrochemical performance of  $\text{CoCr}_7\text{C}_3@\text{CNFs}$  was studied in 1.0 M NaCl solution at  $5 \text{ mV s}^{-1}$  to record a specific capacitance of  $250 \text{ F g}^{-1}$ . Electrochemical impedance spectroscopy measurements indicated better electron transfer properties after introducing  $\text{CoCr}_7\text{C}_3$  to the CNFs structure. Furthermore, its outstanding electrosorption capacity of  $20.40 \text{ mg g}^{-1}$  might encourage the preparation of additional nanocomposites for future capacitive deionization (CDI) technology.



2020-2021	
Paper Title	Electro-desalination of saline solutions by multiwall carbon nanotube electrodes
Journal Name	Journal of Saudi Chemical Society
Link of the paper	<a href="https://www.sciencedirect.com/science/article/pii/S1319610321001332">https://www.sciencedirect.com/science/article/pii/S1319610321001332</a>
Abstract	Electrodes of multiwall carbon nanotube (MWCNT) with <u>polytetrafluoroethylene</u> (PTFE) binding were prepared for NaCl removal from water in the electrosorption system. SEM, XRD and BET analysis were used to characterize the prepared electrodes. The optimum

	<p>electrosorption parameters (electrosorption temperature, NaCl concentration, electrosorption time, and potential) were studied. The maximum electrosorption capacity (15.64 mg/g) was obtained at <math>-1.0</math> V, 100 min, and <math>30^{\circ}\text{C}</math>. The electrosorption capacity of electrodes decreased from 15.64 mg/g to 6.15 mg/g with the temperature rise from 30 to <math>50^{\circ}\text{C}</math>. Also, the kinetics of electrosorption NaCl by Electrodes was investigated by pseudo-first-order and pseudo-second-order. The results indicated that the electrosorption data will fit with the pseudo-first-order model indicating the physio-electrosorption of NaCl by Electrodes with activation energy was <math>19.45\text{ kJ mol}^{-1}</math>. The regeneration result indicated the exceptional and stable reusability of MWCNT/PTFE in the NaCl</p>
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2020-2021	
<b>Paper Title</b>	Active adsorption performance of planetary ball milled Saudi Arabian bentonite clay for the removal of copper ions from aqueous solution
<b>Journal Name</b>	EPL (Europhysics Letters)
<b>Link of the paper</b>	<a href="https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta">https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta</a>
<b>Abstract</b>	We report the role of local bentonite clay in the removal of $\text{Cu}^{2+}$ ions from aqueous solution. The fine bentonite



clay powder was analysed by XRD, FTIR, SEM and DLS analysis techniques. Further, the adsorption experiments were carried out by varying many factors such as weight and size of bentonite clay, residence time,  $pH$  of the solution, stirring rate, temperature, and flow rate. The optimum conditions for effective removal of  $Cu^{2+}$  ions was 1 g dose of bentonite and 63  $\mu m$  size of bentonite, 50 minutes of residence time and 50  $^{\circ}C$  temperature at  $pH$  3 with a flow rate of 1 L/min. The data fitted well the Freundlich model and a maximum adsorption capacity of 61.72 mg/g has been obtained. The value of Gibbs free energy changes ( $\Delta G^{\circ}$ ), enthalpy changes ( $\Delta H^{\circ}$ ) and entropy changes ( $\Delta S^{\circ}$ ) were found to be  $-3819.86 \text{ J mol}^{-1}K^{-1}$ ,  $+15079.10 \text{ J mol}^{-1}K^{-1}$  and  $+58.60 \text{ J mol}^{-1}K^{-1}$ , respectively.

Google Scholar link

<https://scholar.google.com/citations?hl=en&user=57a2-04AAAAJ>

Research gate link

<https://www.researchgate.net/profile/Nasser-Zouli>



Scopus link

<https://www.scopus.com/authid/detail.uri?authorId=57194175488>

Faculty Name: Ahmed Abutaleb

2019-2020	
<b>Paper Title</b>	Removal and recovery of U(VI) from aqueous effluents by flax fiber: Adsorption, desorption and batch adsorber proposal
<b>Journal Name</b>	Journal of Advanced Research
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S2090123219301699">https://www.sciencedirect.com/science/article/pii/S2090123219301699</a>
<b>Abstract</b>	Flax fiber (Linen fiber), a valuable and inexpensive material was used as sorbent material in the uptake of uranium ion for the safe disposal of liquid effluent. Flax fibers were characterized using BET, XRD, TGA, DTA and FTIR analyses, and the results confirmed the ability of flax fiber to adsorb uranium. The removal efficiency reached 94.50% at pH 4, 1.2 g adsorbent dose and 100 min in batch technique. Adsorption results were fitted well



	to the Langmuir isotherm. The recovery of U (VI) to form yellow cake was investigated by precipitation using $\text{NH}_4\text{OH}$ (33%). The results show that flax fibers are an acceptable sorbent for the removal and recovery of U (VI) from liquid effluents of low and high initial concentrations. The design of a full scale batch unit was also proposed and the necessary data was suggested.
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2019-2020	
<b>Paper Title</b>	Uranium (VI) ions uptake from liquid wastes by solanum incanum leaves: biosorption, desorption and recovery
<b>Journal Name</b>	Alexandria Engineering Journal
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S1110016820301125">https://www.sciencedirect.com/science/article/pii/S1110016820301125</a>
<b>Abstract</b>	Nuclear energy and its technologies can be used in several fields besides generating electricity, such as agriculture, food, medicine, space exploration and desalination [1]. Besides the great benefit in the fields of nuclear technology, it produces radioactive waste that harms all environmental life and it is restricted by government agencies to protect human health and the environment [2], [3], [4]. Radioactive waste varies according to its radioactivity, as short, medium and high radioactivity, short radioactive wastes are subjected to treatment and then discharged into the environment [5], [6]. This treatment carried out by placing these wastes in glass containers until their radioactivity is lowered. For medium and high radioactive wastes, disposal requires stricter measures and storage in geological layers. Despite the high cost-effectiveness of nuclear energy in



providing electricity, the danger of radioactive materials and the difficulty of disposing of nuclear waste, this requires relying on non-polluting energy alternatives, such as solar, wind, hydro, geothermal, etc. [7], [8]. Uranium is an imperative constituent in nuclear fuel manufacturing and also, is the main element of radioactive waste that needs to remove before disposal. There are specialized processes in the treatment of liquid radioactive wastes such as evaporation, precipitation, extraction, and adsorption [9], [10], [11], [12]. In low influent concentrations of radioactive elements, adsorption is an effective process in the removal and recovery of radioactive elements from the liquid phase [13]. There are many adsorbents used in the adsorption process, such as activated carbon, agriculture byproducts, polymers, biomass and nano-materials [14], [15], [16], [17], [18], [19], [20], [21], [22]. The selection of adsorbents used in the adsorption process depends on their effectiveness and also on the possibility of reducing their volume after saturated with pollutants so that it can be easily disposed of using the burial process. *Solanum incanum* is a plant grows naturally in southern Saudi Arabia and has some uses in leather tanning. Economically, this plant has medicinal properties in reducing the risk of high blood pressure and stroke and heart disease. Also, leaves and stems are useful as green compost. The aim of this work is the use of *solanum incanum* leaves (SNL) as a new biodegradation agriculture material to remove and recover U (VI) from the liquid wastes in a batch system. Biosorption operating parameters, isotherms and kinetics were studied. Also, the reusability of SNL and recovery of U (VI) were investigated.



2019-2020	
<b>Paper Title</b>	UV light enabled photocatalytic activity of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> nanoparticles synthesized via phase transformation
<b>Journal Name</b>	Materials Letters
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0167577X19313795">https://www.sciencedirect.com/science/article/abs/pii/S0167577X19313795</a>
<b>Abstract</b>	In this work, hematite ( $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> ) nanoparticles (NPs) were synthesized by co-precipitation method involving chemical precipitation of aqueous salts of iron (Fe <sup>2+</sup> /Fe <sup>3+</sup> ) using NaOH aqueous solution. The synthesis of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> NPs via phase transformation and its photocatalytic application under ultra violet (UV) light is rarely reported. The maximum removal of methylene blue (MB) dye (92%) was achieved at pH 10 and 200 mg amount of catalyst, whereas the concentration of dye was 10 ppm. The removal percentage of MB dye was found to vary



	with pH of the solution, concentrations of dye, and amount of $\alpha\text{-Fe}_2\text{O}_3$ NPs for certain interval of time. Moreover, plot of $\ln(C/C_0)$ Vs time exhibited almost a linear relationship between them which suggested the pseudo-first order kinetics reaction of photocatalytic degradation of MB.
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2019-2020	
<b>Paper Title</b>	Electrospun carbon nanofiber-encapsulated NiS nanoparticles as an efficient catalyst for hydrogen production from hydrolysis of sodium borohydride
<b>Journal Name</b>	International Journal of Hydrogen Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0360319919324528">https://www.sciencedirect.com/science/article/abs/pii/S0360319919324528</a>
<b>Abstract</b>	Carbon nanofibers (CNFs) incorporating NiS nanoparticles (NPs), namely NiS@CNFs were prepared by one-step electrospinning and successfully employed as a catalyst for hydrogen production from hydrolytic dehydrogenation of sodium borohydride (SBH). As-prepared NiS@CNFs, composed of polyacrylonitrile (PAN), nickel acetate, and ammonium sulfide, was calcined at 900 °C in argon atmosphere, and characterized using standard surface



	<p>science techniques. The combined results revealed the growth of NiS NPs inside the CNFs, hence confirmed the presence of elemental Ni, S, and C. The as-prepared NiS@CNFs catalyst has a significantly higher surface area (<math>650.92 \text{ m}^2/\text{g}</math>) than the reported value of <math>376 \text{ m}^2/\text{g}</math>. Importantly, this catalyst exhibited a much higher catalytic performance, for <math>\text{H}_2</math> production from SBH, than that of Ni@CNFs, as evidenced by its low activation energy (<math>\sim 25.11576 \text{ kJ/mol}</math>) and their <math>R_{\text{max}}</math> values of 2962 vs. 1770 <math>\text{mL/g}\cdot\text{min}</math>. Recyclability tests on using NiS@CNFs catalyst showed quantitatively production (<math>\sim 100\%</math> conversion) of <math>\text{H}_2</math> from SBH and retained up to 70% of its initial catalytic activity after five successive cycles. The low cost and high catalytic performance of the designed NiS@CNFs catalyst enable facile <math>\text{H}_2</math> production from readily available hydrogen storage materials.</p>
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2019-2020	
<b>Paper Title</b>	A Comprehensive Review Covering Conventional and Structured Catalysis for Methanol to Propylene Conversion.
<b>Journal Name</b>	Catalysis Letter
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s10562-019-02914-4">https://link.springer.com/article/10.1007/s10562-019-02914-4</a>
<b>Abstract</b>	The conversion of methanol to propylene is a value-added process and has gained extreme significance because of high demand for propylene in the production of petrochemicals. The demand for propylene is increasing due to



increasing usage of polypropylene. During the last two decades, propylene demand growth has far overtaken ethylene demand growth and it is predicted to be more than double in the next 20 years. The Dalian Institute of Chemical Physics has been working for the last three decades in the R&D of the methanol to olefins reaction and have developed MTP technology. The catalytic materials used in methanol to propylene conversion include SAPO-34 (small-pore molecular sieves), ZSM-5 (medium-pore zeolites) and its modified forms. Limited research has also been done using large pore zeolites such as mordenite and beta. High-silica EU-1 zeolite has been found as an efficient catalyst for MTP conversion. The use of SAPO-18, ZSM-23 and CON-type zeolite for MTP reaction has also been discussed. Methanol to propylene research has been carried using structured catalysts including ceramic based honeycomb or monolith and silicon carbide foam. The major difference in process design between SAPO-34 and H-ZSM-5 is that the SAPO-34 is used in fluidized bed process while H-ZSM-5 catalyst is used in fixed bed process. SAPO-34 is a selective catalyst for olefins but deactivates fast and thus requires frequent regeneration. The H-ZSM-5 is less selective for olefins but shows less deactivation and thus quite stable. A number of structured supports such as monolith, foam, and mesh have been researched for coating with the active zeolite based catalysts. The structured catalysts have the advantage to reduce the diffusional limitations of pellet catalyst system and have exhibited excellent results in terms of activity and selectivity for olefins as well as in reducing aromatics formation. The results obtained in our research using zeolite coated structured catalysts have shown significant increase in propylene selectivity. The significant findings of our work has been published and patented with US Patent and Trademark Office (USPTO).



2020-2021	
<b>Paper Title</b>	Fabrication of electrospun nickel sulphide nanoparticles onto carbon nanofibers for efficient urea electro-oxidation in alkaline medium
<b>Journal Name</b>	International Journal of Hydrogen Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0360319921002871">https://www.sciencedirect.com/science/article/abs/pii/S0360319921002871</a>
<b>Abstract</b>	To design and synthesize a noble-metal free electrocatalyst with increased efficiency and stability during urea electro-oxidation in alkaline solution is still an important challenge in the electrocatalytic field. In this work, carbon nanofibers were decorated with nickel sulphide nanoparticles [NiS@CNFs] through the <a href="#">electrospinning</a>



[technique](#) with subsequent heating into an [argon atmosphere](#) at 900 °C for 2 h. This formed [nanomaterial](#) was extensively characterized through X-ray diffraction (XRD), field-emission scanning electron microscopy (FE-SEM), [transmission electron microscopy](#) (TEM), energy dispersive X-ray analysis (EDX), Raman spectroscopy and N<sub>2</sub> adsorption-desorption measurements. A conductive network of intertwined CNFs was clearly detected by FE-SEM analysis technique with varied diameters in the range of 0.6–1 μm. A highly porous nature could be suggested after incorporating NiS nanospecies resulting in increased specific surface area and valuable [electrocatalytic activity](#) for urea molecules electro-oxidation. The [pore size distribution](#) curves showed a decreased average pore diameter for NiS@CNFs nanocomposite by 2.53 folds when compared to that at CNFs. The electroactivity of NiS@CNFs nanomaterial for catalyzing urea electro-oxidation was investigated using cyclic voltammetry, [chronoamperometry](#) and electrochemical [impedance spectroscopy](#) measurements. Increased activity of this nanocatalyst was registered when urea molecules were added in increased concentrations into KOH solution. Lowered resistance values were also obtained describing the charge transfer process to confirm the feasibility of the studied reaction at NiS@CNFs surface. Moreover, its drawn chronoamperogram showed a stable performance during operation for long periods revealing a lowered catalytic decay. Accordingly, the aforementioned results of our fabricated nanomaterial could provide a good guide for fabricating suitable electrocatalysts for various electrocatalytic purposes.



2020-2021	
<b>Paper Title</b>	One-pot preparation of CdO/ZnO core/shell nanofibers: An efficient photocatalyst
<b>Journal Name</b>	Alexandria Engineering Journal
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S111001682030613X">https://www.sciencedirect.com/science/article/pii/S111001682030613X</a>
<b>Abstract</b>	Herein, CdO/ZnO core/shell nanofibers (NFs) were fabricated by one-pot electrospinning technique from a solution composed of poly(vinyl alcohol), zinc acetate dihydrate, and cadmium acetate dihydrate. CdO/ZnO core/shell NFs exhibits an excellent photo-degradation of methylene blue (MB) under sunlight irradiation compared to pristine ZnO NFs. As 98.4% and 42.4% of MB dye was de-colored during 210 min using CdO/ZnO core/shell NFs and pristine ZnO NFs, respectively. The photo-degradation reaction of MB with CdO/ZnO core/shell NFs followed the pseudo-first-order relation.



2020-2021	
<b>Paper Title</b>	The effect of steam curing regimes on the chloride resistance and pore size of high–strength green concrete
<b>Journal Name</b>	Construction and Building Materials
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0950061821001690">https://www.sciencedirect.com/science/article/abs/pii/S0950061821001690</a>
<b>Abstract</b>	<p>Since diminishing the consumption of cement has many benefits, ongoing research on the incorporation of the industrial/agricultural wastes as an alternative or partial substitution for cement is of paramount significance. This study aims to examine the effect of steam curing regimes (SCRs) on the chloride resistance and microstructure of high-strength green concrete (HSGC). To this end, palm oil fuel ash, a type of waste from the palm oil industry, was treated so that ultrafine palm oil fuel ash (U-POFA) could be obtained. U-POFA was utilized as a partial substitute of the mass of cement at 0%, 20%, 40%, and 60% to produce HSGC. Varying steam curing temperatures (50 °C, 65 °C, and 80 °C) and varying periods (6, 11, and 16 h) were applied to the HSGC. Moreover, a steam curing cycle that did not exceed 24 h was applied. The tests performed on the HSGC samples</p>



included compressive strength (CS), rapid chloride permeability, and rapid chloride migration. The evaluation of the microstructure of the HSGC samples was undertaken via Mercury Intrusion Porosimetry (MIP) in addition to scanning electron microscopy with energy dispersive x-ray. The results showed that the application of SCRs with a high volume with UPOFA resulted in enhanced CS, chloride resistance, and microstructure properties of HSGC at an early age of 3 days and a later age of 360 days. Such enhancement in the concrete properties mainly depends on the cement replacement rates by U-POFA, temperature, and the steam curing period. It was, therefore, concluded that U-POFA played a key role in reducing the negative impact, which might have been caused by the utilization of varying SCRs.



2020-2021	
<b>Paper Title</b>	Thermal conductivity enhancement for CuO nanoflakes in oil-based and oil blend-based nanofluids
<b>Journal Name</b>	Journal of the Chinese Chemical Society
<b>Link of the paper</b>	<a href="https://onlinelibrary.wiley.com/doi/abs/10.1002/jccs.202100005">https://onlinelibrary.wiley.com/doi/abs/10.1002/jccs.202100005</a>
<b>Abstract</b>	<p>We report the synthesis and characterization of copper oxide (CuO) nanoflakes (Nflks) for thermal conductivity analysis. The synthesized Nflks were used for the preparation of oil- based and oil blend- based nanofluids. A dynamic light scattering study was carried out for aqueous suspension of CuO Nflks. The size distribution data show the two peaks emerged at <math>178.2 \pm 31.77</math> nm and <math>861.7 \pm 248.6</math> nm. The zeta potential was investigated, and the peak was observed at <math>-46.4 \pm 14.3</math> mV. The average thermal conductivity coefficients were calculated for mineral oil, sunflower oil, and oil blend, which were found to be 0.086, 0.105, and 0.099 W/mK, respectively. Furthermore, thermal conductivity enhancement was calculated, and the maximum percent enhancement was recorded for sunflower oil- based nanofluid, which was found to be ~20.68% at 0.46 vol%. At similar vol%, the enhancement in thermal conductivity in oil blend- based and mineral oil- based nanofluids was found to be 16.14</p>



	and 15.73%, respectively. The oil- based nanofluids are promising in electronics and modern computational devices to minimize the heating effect.
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2020-2021	
<b>Paper Title</b>	Enhanced electro-adsorption desalination performance of graphene by TiC
<b>Journal Name</b>	Separation and Purification Technology
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S1383586620320761">https://www.sciencedirect.com/science/article/abs/pii/S1383586620320761</a>
<b>Abstract</b>	Capacitive deionization (CDI) process is aiming to desalinate water samples by electrosorption of salty ions on the surfaces of electrodes with opposite charges. Therefore, the choice of the electrode material has its main role in controlling the overall efficiency of synthesized CDI cell. In this work, graphene nanoflakes (GNFs) were examined as an interesting carbon-based material in CDI technology. Their electrochemical and desalination characteristics were significantly enhanced by introducing TiC nanoparticles in different wt.% values [5, 10 and 20] through the application of microwave irradiation followed by hydrothermal treatment. The morphology, crystal structure, porosity, composition and hydrophilic nature of fabricated nanomaterials were investigated using scanning and transmission electron microscopes (SEM, TEM), X-ray diffractometer (XRD), N <sub>2</sub> adsorption – desorption isotherms, energy dispersive X-ray analyzer (EDX) and water contact angle measurements,



respectively. Electrochemical studies revealed outperformed specific capacitance values of TiC incorporated graphene nanoflakes by 5.53, 14.47 and 7.64 folds for those containing 5, 10 and 20 wt% TiC, respectively when compared to the estimated one using GNFs at  $5 \text{ mV s}^{-1}$ . An excellent salt removal efficiency value of 91% was calculated when 10 wt% TiC was added to GNFs with electrosorption capacity of  $22.8 \text{ mg g}^{-1}$  at conductivity value of  $1 \text{ mS cm}^{-1}$ . Galvanostatic charge–discharge experiments revealed good reversible performance of this nanomaterial with high stability over 30 cycles. These obtained results could elect TiC incorporated GNFs as suitable candidates for water desalination using CDI technology.



2020-2021	
<b>Paper Title</b>	Influence of steam curing regimes on the properties of ultrafine POFA-based high-strength green concrete
<b>Journal Name</b>	Journal of Building Engineering
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S2352710221000607">https://www.sciencedirect.com/science/article/abs/pii/S2352710221000607</a>
<b>Abstract</b>	<p>This paper investigated the influence of steam curing regimes on the properties of high-strength green concrete (HSGC) containing varying quantities of ultra-fine palm oil fuel ash (U-POFA) from 0%, 20%, 40% and 60% from the mass of Portland cement. The HSGC specimens were steam cured at 50 °C, 65 °C, and 80 °C for 16 h in order to evaluate the effect of curing temperatures. Besides, the HSGC specimens were also cured at 80 °C for 6, 11 and 16 h in order to investigate the effect of curing period. The influence of different temperatures and periods of steam curing on the development of the compressive strength (CS) and microstructure of the HSGC was investigated at 1, 3, 7, 28, 90, 180 and 360 days. The results showed that replacing 20%, 40% and 60% of ordinary Portland cement (OPC) with U-POFA exhibited a decrease in the CS in early ages up to 7 days, whereas the long-term CS at 360 days improved by 5.4%, 10% and 9.2%, respectively in comparison to the control concrete mixture. It was also found that the application of steam curing regime at 80 °C for 16 h contributed towards increasing the strength of concrete by 193% at 1 day for HSGC containing 60% U-POFA when compared</p>



	<p>to normally cured specimen. The trends in CS development were complimented with microstructural analyses based on TGA, XRD and SEM/EDX. It was observed that steam curing has a significant influence on microstructures of matrix in early ages. However, it can be concluded that the partial replacement of U-POFA has positive impacts on the long-term properties of the HSGC at 360 days.</p>
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2020-2021	
<b>Paper Title</b>	Chapter 8 - Aerogel and its composites for sensing, adsorption, and photocatalysis
<b>Journal Name</b>	Advances in Aerogel Composites for Environmental Remediation
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/B9780128207321000084">https://www.sciencedirect.com/science/article/pii/B9780128207321000084</a>
<b>Abstract</b>	<p>The aerogels are porous with low density structures and have been explored in the range of applications including catalysis, thermal insulators, solar energy uses, piezoelectric, energy conversions-storage, low-temperature glass formation, sensors, adsorption, and photocatalysis. A variety of aerogels with unusual architect have been developed such as organic aerogels, nonsilica oxide aerogels, chalcogenide aerogels, carbon aerogels, and others. In the present chapter, we have tried to compile a brief research associated with the development of aerogels and their composites and used in the various applications of present need of water pollution and its remediation. Additionally, we have discussed the problems with the different examples of aerogels as sensors, adsorbents, and photocatalysts.</p>



2020-2021	
<b>Paper Title</b>	Catalytic and Photocatalytic Electrospun Nanofibers for Hydrogen Generation from Ammonia Borane Complex: A Review
<b>Journal Name</b>	Polymers
<b>Link of the paper</b>	<a href="https://www.mdpi.com/2073-4360/13/14/2290">https://www.mdpi.com/2073-4360/13/14/2290</a>
<b>Abstract</b>	<p>Hydrogen (H<sub>2</sub>) is a promising renewable energy source that can replace fossil fuels since it can solve several environmental and economic issues. However, the widespread usage of H<sub>2</sub> is constrained by its storage and safety issues. Many researchers consider solid materials with an excellent capacity for H<sub>2</sub> storage and generation as the solution for most H<sub>2</sub>-related issues. Among solid materials, ammonia borane (abbreviated hereafter as AB) is considered one of the best hydrogen storage materials due to its extraordinary H<sub>2</sub> content and small density. However, the process must be conducted in the presence of efficient catalysts to obtain a reasonable amount of generated H<sub>2</sub>. Electrospun nanofibrous catalysts are a new class of efficient catalysts that involves the usage of polymers. Here, a comprehensive review of the ceramic-supported electrospun NF catalysts for AB hydrolysis is presented, with a special focus on catalytic and photolytic performance and preparation steps. Photocatalytic AB hydrolysis was discussed in detail due to its importance and promising results. AB photocatalytic hydrolysis mechanisms under light were also explained. Electrospun catalysts show excellent activity for AB hydrolysis with good recyclability. Kinetics studies show that the AB hydrolysis reaction is independent of AB concentration and</p>



	the first-order reaction of NF catalysts.
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2020-2021
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<b>Paper Title</b>	Systematic exploration of electrospun polyvinylidene fluoride (PVDF)/multi-walled carbon nanotubes' (MWCNTs) composite nanofibres for humidity sensing application
<b>Journal Name</b>	Journal of Taibah University for Science
<b>Link of the paper</b>	<a href="https://www.tandfonline.com/doi/full/10.1080/16583655.2021.1964232">https://www.tandfonline.com/doi/full/10.1080/16583655.2021.1964232</a>
<b>Abstract</b>	<p>In this paper, the electrospinning technique was used to obtain multi-walled carbon nanotubes (MWCNTs) supported on electrospun polyvinylidene fluoride (PVDF) nanofibres (NFs) (PVDF/MWCNTs), a composite-based mat of NFs. The surface morphology of the PVDF/MWCNTs NFs was analysed by a field effect scanning electron microscope. The thickness of the NFs mat varies with the time and concentration of MWCNTs. The contact angle (CA) measurement shows that 2.5 wt% of MWCNTs in NF mat shows 61° CA which suggests the hydrophilic nature of the prepared NF mat. Fourier transform infrared and Raman spectroscopy revealed the implantation of MWCNTs in PVDF matrix and side wall attachment with polymer chain. X-ray diffraction and FTIR studies show that as the MWCNT content increases, the <math>\alpha</math>-phase in PVDF decreases, indicating that MWCNT has a strong effect on phase transformation. Consequently, the NFs show an almost linear capacitive response. They showed that the high-capacitive changes in PVDF/MWCNTs' NFs are achieved at 2.5 wt% MWCNTs' addition at different humidity levels. The sensitivity of the PVDF/MWCNTs' (2.5 wt%) NF mat-based capacitive sensor exhibits high sensitivity <math>\sim 0.71\text{pF}/\%\text{RH}</math>. Hence, PVDF/MWCNTs' NFs perform attention-grabbing properties for the humidity sensing application.</p>



2020-2021	
<b>Paper Title</b>	Thermal conductivity enhancement for CuO nanoflakes in oil-based and oil blend-based nanofluids
<b>Journal Name</b>	Journal of the Chinese Chemical Society
<b>Link of the paper</b>	<a href="https://onlinelibrary.wiley.com/doi/abs/10.1002/jccs.202100005">https://onlinelibrary.wiley.com/doi/abs/10.1002/jccs.202100005</a>
<b>Abstract</b>	<p>We report the synthesis and characterization of copper oxide (CuO) nanoflakes (Nflks) for thermal conductivity analysis. The synthesized Nflks were used for the preparation of oil-based and oil blend-based nanofluids. A dynamic light scattering study was carried out for aqueous suspension of CuO Nflks. The size distribution data show the two peaks emerged at <math>178.2 \pm 31.77</math> nm and <math>861.7 \pm 248.6</math> nm. The zeta potential was investigated, and the peak was observed at <math>-46.4 \pm 14.3</math> mV. The average thermal conductivity coefficients were calculated for mineral oil, sunflower oil, and oil blend, which were found to be 0.086, 0.105, and 0.099 W/mK, respectively. Furthermore, thermal conductivity enhancement was calculated, and the maximum percent enhancement was recorded for sunflower oil-based nanofluid, which was found to be ~20.68% at 0.46 vol%. At similar vol%, the enhancement in thermal conductivity in oil blend-based and mineral oil-based nanofluids was found to be 16.14 and 15.73%, respectively. The oil-based nanofluids are promising in electronics and modern computational devices to minimize the heating effect.</p>



2020-2021	
<b>Paper Title</b>	A comprehensive and updated review of studies on the oxidation of cyclohexane to produce ketone-alcohol (KA) oil
<b>Journal Name</b>	Reviews in Chemical Engineering
<b>Link of the paper</b>	<a href="https://www.degruyter.com/document/doi/10.1515/revce-2020-0059/html">https://www.degruyter.com/document/doi/10.1515/revce-2020-0059/html</a>
<b>Abstract</b>	Oxidation of cyclohexane is an essential chemical reaction for the industrial manufacture of cyclohexanol and cyclohexanone. These two compounds, together known as ketone–alcohol (KA) oil, are the main feedstock for nylon 6 and nylon 6,6 productions. Several types of catalysts and reaction conditions have been used for cyclohexane oxidation. This paper presents a thorough literature review of catalytic materials used for cyclohexane oxidation to produce KA oil using oxygen, air and other oxidizing agents as well as utilizing different solvents. This review covers research and development reported over the years 2014–2020. This review aims to comprehend the type of catalysts, solvents, oxidants and other reaction parameters used for the oxidation of cyclohexane. Three types of cyclohexane oxidation processes namely thermocatalytic, photocatalytic and microwave-assisted catalytic have been reported. The results of the review showed that metal and metal oxide



	<p>loaded silica catalysts performed excellently and provided high selectivity of KA oil and cyclohexane conversion. The use of peroxides is not feasible due to their high price compared to air and oxygen. Gold nanoparticles supported on silica performed with high selectivity and good conversion. The use of hydrochloric acid as an additive was found very effective to enhance the photocatalytic oxidation of cyclohexane. Water on the catalyst surface enhanced the reactivity of the photocatalysts since it helps in the generation of hydroxyl radicals.</p>
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<b>Paper Title</b>	Polarized fiber mats for catalyst support structures
<b>Journal Name</b>	<a href="#">US.patent</a>
<b>Link of the paper</b>	<a href="https://patents.google.com/patent/US10994263B2/en">https://patents.google.com/patent/US10994263B2/en</a>
<b>Abstract</b>	A polymer-catalyst assembly includes polarized polymeric nanofibers retaining a plurality of catalytic metallic nanoparticles. A method of making the polarized polymer-catalyst assembly may include providing a fiber mat having polymeric nanofibers retaining a plurality of catalytic metallic nanoparticles, stretching the fiber mat in a uniaxial direction, simultaneous with the step of stretching, thermally heating the fiber mat, simultaneous with the steps of stretching and thermally heating, subjecting the fiber mat to an electric field, whereby the simultaneous steps of stretching, thermally heating, and subjecting thereby form a polarized fiber mat.



2020-2021	
<b>Paper Title</b>	Colloidal Fe <sub>3</sub> O <sub>4</sub> nanoparticles-based oil blend ferro-nanofluid for heat transfer application
<b>Journal Name</b>	The European Physical Journal Plus
<b>Link of the paper</b>	<a href="https://epjplus.epj.org/articles/epjplus/abs/2021/07/13360_2021_Article_1711/13360_2021_Article_1711.html">https://epjplus.epj.org/articles/epjplus/abs/2021/07/13360_2021_Article_1711/13360_2021_Article_1711.html</a>
<b>Abstract</b>	<p>The thermal conductivity enhancement of oil blend-based ferro-nanofluids for heat transfer application is rarely reported. Herein, highly stable ferro-nanofluids were prepared by dispersing oleic acid coated Fe<sub>3</sub>O<sub>4</sub> NPs into the blend of sunflower oil and mineral oil at varying volume ratios. The maximum thermal conductivity enhancement of ~91% was obtained for M10 (base fluid) oil blend-based ferro-nanofluid at 0.6 vol% of Fe<sub>3</sub>O<sub>4</sub> NPs as compared to the pure mineral oil. The dispersed NPs into the oil blend-based ferro-nanofluid executed Brownian motion which led to the collisions between the NPs as well as with the molecules of the oil blend. The formation of a chain like network by small-sized NPs effectively led to a larger volume fraction of NPs, which caused the enhancement of the thermal conductivity of oil blend-based ferro-nanofluids. Moreover, a nano-adsorption layer of oil blend was formed on the surfaces of NPs, which served as a bridge for the heat exchange between NPs and oil blend. The experimental results were validated against a similar pre-existing thermal conductivity enhancement model. Hence, this study provides a more efficient method to prepare oil-based ferro-nanofluids with a tunable thermal conductivity for heat transfer applications.</p>



2020-2021	
<b>Paper Title</b>	An Updated Comprehensive Literature Review of Phenol Hydrogenation Studies
<b>Journal Name</b>	Catalysis Letters
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s10562-021-03714-5">https://link.springer.com/article/10.1007/s10562-021-03714-5</a>
<b>Abstract</b>	Cyclohexanone is an important industrial intermediate to produce nylons. The main industrial routes for cyclohexanone manufacture used cyclohexane and phenol as feedstock. The selective hydrogenation of phenol to cyclohexanone comprises one-step and two-step processes. This review presents a detailed analysis of the research findings available in the open literature for phenol hydrogenation to produce cyclohexanone and cyclohexanol and covers the research conducted during 2014–2020 using conventional and modern catalysts. This review aims to disseminate the knowledge of the current research conducted for phenol hydrogenation and provide a comprehensive resource for researchers working in this field. This review has included and discussed both methods of thermocatalytic and electrocatalytic hydrogenation of phenol. Most of the studies have used carbon or carbon–nitrogen supported catalysts loaded with Pd. The carbon and carbon–nitrogen materials were



	<p>derived from different sources including polymers, activated carbon, and MOF. Oxygen treatment was found to produce highly active and stable catalysts. The high performance was found associated with the high surface area of the catalyst and uniformly dispersed metal nanoparticles. The acidic conditions exhibited an increase in catalyst performance. Alkali-promoted precious metal-loaded catalysts performed better than un-promoted catalysts.</p>
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2020-2021	
<b>Paper Title</b>	Active adsorption performance of planetary ball milled Saudi Arabian bentonite clay for the removal of copper ions from aqueous solution



<b>Journal Name</b>	EPL (Europhysics Letters)
<b>Link of the paper</b>	<a href="https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta">https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta</a>
<b>Abstract</b>	<p>We report the role of local bentonite clay in the removal of <math>\text{Cu}^{2+}</math> ions from aqueous solution. The fine bentonite clay powder was analysed by XRD, FTIR, SEM and DLS analysis techniques. Further, the adsorption experiments were carried out by varying many factors such as weight and size of bentonite clay, residence time, <math>\text{pH}</math> of the solution, stirring rate, temperature, and flow rate. The optimum conditions for effective removal of <math>\text{Cu}^{2+}</math> ions was 1 g dose of bentonite and 63 <math>\mu\text{m}</math> size of bentonite, 50 minutes of residence time and 50 <math>^{\circ}\text{C}</math> temperature at <math>\text{pH}</math> 3 with a flow rate of 1 L/min. The data fitted well the Freundlich model and a maximum adsorption capacity of 61.72 mg/g has been obtained. The value of Gibbs free energy changes (<math>\Delta G^{\circ}</math>), enthalpy changes (<math>\Delta H^{\circ}</math>) and entropy changes (<math>\Delta S^{\circ}</math>) were found to be <math>-3819.86 \text{ J mol}^{-1}\text{K}^{-1}</math>, <math>+15079.10 \text{ J mol}^{-1}\text{K}^{-1}</math> and <math>+58.60 \text{ J mol}^{-1}\text{K}^{-1}</math>, respectively.</p>

2020-2021	
<b>Paper Title</b>	Insights on the role of supporting electrospun carbon nanofibers with binary metallic carbides for enhancing their capacitive deionization performance
<b>Journal Name</b>	Journal of Materials Research and Technology



Link of the paper	<a href="https://www.sciencedirect.com/science/article/pii/S2238785421011170">https://www.sciencedirect.com/science/article/pii/S2238785421011170</a>
Abstract	<p>Recent development in desalination technology can be progressed in terms of fabricated <u>nanomaterials</u> and operating parameters, as one among energy-storing systems including fuel cells, capacitors, batteries, and so on. Regarding the examined nanomaterials, embedded <math>\text{CoCr}_7\text{C}_3</math> nanoparticles onto carbon nanofibers (<math>\text{CoCr}_7\text{C}_3@\text{CNFs}</math>) were prepared using a facile electrospinning technique. Characterization techniques, such as XRD, FESEM, TEM, <u>HRTEM</u>, STEM, and EDX, were served to define the crystallinity, morphology and chemical composition of the synthesized nanofibers. XRD chart demonstrated the formation of <math>\text{Cr}_7\text{C}_3</math> species along with deposited metallic cobalt in this nanomaterial. The morphological study revealed the uniform distribution of metallic cobalt and <math>\text{Cr}_7\text{C}_3</math> nanoparticles onto the fibrous CNFs structure. The electrochemical performance of <math>\text{CoCr}_7\text{C}_3@\text{CNFs}</math> was studied in 1.0 M NaCl solution at <math>5 \text{ mV s}^{-1}</math> to record a specific capacitance of <math>250 \text{ F g}^{-1}</math>. <u>Electrochemical impedance spectroscopy</u> measurements indicated better <u>electron transfer</u> properties after introducing <math>\text{CoCr}_7\text{C}_3</math> to the CNFs structure. Furthermore, its outstanding electrosorption capacity of <math>20.40 \text{ mg g}^{-1}</math> might encourage the preparation of additional nanocomposites for future capacitive deionization (CDI) technology.</p>



2020-2021	
<b>Paper Title</b>	Graphitic nanofibers supported NiMn bimetallic nanoalloys as catalysts for H <sub>2</sub> generation from ammonia borane
<b>Journal Name</b>	International Journal of Hydrogen Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0360319921032511">https://www.sciencedirect.com/science/article/abs/pii/S0360319921032511</a>
<b>Abstract</b>	<p>Bimetallic nickel manganese nanoalloy-decorated graphitic <u>nanofibers</u> were prepared using electrospinning. The introduced catalysts were explored as an effective and inexpensive catalyst for H<sub>2</sub> generation from <u>ammonia borane</u> using hydrolysis. Standard techniques were used to determine the morphology and chemical composition of the nanofibers. Characterization indicated successful formation of bimetallic nickel-manganese-decorated graphitic nanofibers. Introduced effective catalysts showed a high <u>reusability</u> for H<sub>2</sub> generation using ammonia borane hydrolysis at low concentrations and temperatures. All formations of the introduced catalysts demonstrated a higher <u>catalytic activity</u> in H<sub>2</sub> generation than nickel-decorated <u>carbon nanofibers</u>. Samples composed of 55 wt% nickel and 45 wt% manganese showed the best catalytic activity compared with other formulations. Initial <u>turnover frequency</u> (TOF) of this sample was 58.2 min<sup>-1</sup>, twice the TOF of the manganese-free catalyst. Kinetics and thermodynamics revealed that the catalyst concentration followed the pseudo-first order reaction while the ammonia borane concentration follow the pseudo-zero order reaction, providing <u>activation energy</u> of</p>



	38.9 kJ mol <sup>-1</sup> .
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2020-2021	
<b>Paper Title</b>	Sustainable green nanoadsorbents for remediation of pharmaceuticals from water and wastewater: A critical review



<b>Journal Name</b>	Environmental Research
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0013935121015449">https://www.sciencedirect.com/science/article/abs/pii/S0013935121015449</a>
<b>Abstract</b>	<p>In the last three decades, pharmaceutical research has increased tremendously to offer safe and healthy life. However, the high consumption of these harmful drugs has risen devastating impact on ecosystems. Therefore, it is worldwide paramount concern to effectively clean pharmaceuticals contaminated water streams to ensure safer environment and healthier life. Nanotechnology enables to produce new, high-technical material, such as membranes, adsorbent, nano-catalysts, functional surfaces, coverages and reagents for more effective water and wastewater cleanup processes. Nevertheless, nano-sorbent materials are regarded the most appropriate treatment technology for water and wastewater because of their facile application and a large number of adsorbents. Several conventional techniques have been operational for domestic wastewater treatment but are inefficient for pharmaceuticals removal. Alternatively, adsorption techniques have played a pivotal role in water and wastewater treatment for a long, but their rise in attraction is proportional with the continuous emergence of new micropollutants in the aquatic environment and new discoveries of sustainable and low-cost adsorbents. Recently, advancements in adsorption technique for wastewater treatment through nanoadsorbents has greatly increased due to its low production cost, sustainability, better physicochemical properties and high removal performance for pharmaceuticals. Herein, this review critically evaluates the performance of sustainable green nanoadsorbent for the remediation of pharmaceutical pollutants from water. The influential sorption parameters and interaction mechanism are also discussed. Moreover, the future prospects of nanoadsorbents for the remediation of</p>



pharmaceuticals are also presented.

Google Scholar link

<https://scholar.google.com/citations?user=YP8kAFcAAAAJ&hl=en>

Research gate link

<https://www.researchgate.net/profile/Ahmed-Abutaleb-3>

Scopus link

<https://www.scopus.com/authid/detail.uri?authorId=57190944323>



Faculty Name: Dr. Isam Yassin Qudsieh

2020-2021	
<b>Paper Title</b>	<b>CENTRAL COMPOSITE DESIGN OF ARSENIC REMOVAL FROM WATER USING CATIONIC CHITOSAN POLYSACCHARIDE AS A FLOCCULATING AGENT</b>
<b>Journal Name</b>	Jouf University Science and Engineering Journal
<b>Link of the paper</b>	<a href="https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/about-the-journal/">https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/about-the-journal/</a> <a href="https://www.ju.edu.sa/fileadmin/jouf_University_Science_and_Engineering_Journal/Journal/AUSEJ_8-1.pdf">https://www.ju.edu.sa/fileadmin/jouf_University_Science_and_Engineering_Journal/Journal/AUSEJ_8-1.pdf</a>
<b>Abstract</b>	The presence of arsenic in the water supply can be a threat to humans if it is not treated properly. Removal of arsenic from water is important to ensure the healthiness of the water—that it is free from harmful heavy metal contaminants. This article focuses on the efficiency of chitosan in removing arsenic from water using the statistical software Design-Expert. The optimization was performed using central composite designs (CCD) with the following four factors: the dosage of chitosan, contact time, agitation speed, and pH. Each parameter has three levels (two factorial points and one center-point). Therefore, the performance of chitosan was evaluated through factorial experiments using the conventional jar test method. The final arsenic concentration was recorded, and the percentage removed was calculated. A regression model equation was developed with the $R^2$ value of 0.9972 from which the optimal conditions could be produced. The optimal conditions for chitosan to react with arsenic in water were achieved with the following optimum conditions: agitation speed: 187.92 rpm, pH: 6.86, contact time: 4.46 min, and chitosan dosage: 23.76 mg/L. The theoretical optimal percentage removed of arsenic obtained was 98.85%. Therefore, this study could provide a more environment-friendly and



	economical solution than the other methods practiced now.
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<https://www.researchgate.net/profile/Isam-Qudsieh>

Scopus link

<https://www.scopus.com/authid/detail.uri?authorId=6508238267>

Academia link

<https://jazan.academia.edu/IsamYQudsieh>

Faculty Name: Dr. Mohamed Imran Masoom

2019-2020	
<b>Paper Title</b>	Study of Structural, Magnetic, Dielectric Properties and Estimation of Magnetoelectric Coupling of La, Mn co-doped $\text{Bi}_{1-x}\text{La}_x\text{Fe}_{0.97}\text{Mn}_{0.03}\text{O}_3$ Ceramics
<b>Journal Name</b>	Arabian journal of science and engineering
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s13369-019-04078-0">https://link.springer.com/article/10.1007/s13369-019-04078-0</a>
<b>Abstract</b>	La and Mn co-doped $\text{Bi}_{1-x}\text{La}_x\text{Fe}_{0.97}\text{Mn}_{0.03}\text{O}_3$ (BLFMO $_x$ , $x = 0.05, 0.1, 0.2$ ) ceramics were prepared by solid-state reaction method, and their structural, magnetic, dielectric and magnetocapacitance properties were studied. It was discovered that the co-substitution of La & Mn at sites of Bi & Fe suppressed impure phases which normally occur in $\text{BiFeO}_3$ synthesis. BLFMO $_x$ samples were calcinated, and well crystalline phases were acquired at a sintering temperature of 950 °C. X-rays diffraction patterns of the samples were recorded and investigated for the affirmation of crystal structure and determination of the lattice parameters. The normal grain size of the samples was observed to be between 1 and 2 $\mu\text{m}$ . M–H graphs of $\text{BiFeO}_3$ and BLFMO $_{0.05}$ ceramics consist of straight-line, confirming antiferromagnetic nature of samples. Dielectric constant was diminished with increase in frequency for each composition.



	BLFMO <sub>x</sub> ceramics showed negative magnetocapacitance and decrease in dielectric constant with magnetic field. Relative difference in dielectric constant initiated by external magnetic field might be approximated by $\Delta\epsilon/\epsilon = kM^2$ for BLFMO <sub>x</sub> , and here, magnetoelectric interaction ( $k$ ) is negative.
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2019-2020	
<b>Paper Title</b>	UV light enabled photocatalytic activity of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> nanoparticles synthesized via phase transformation
<b>Journal Name</b>	Materials Letters
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0167577X19313795">https://www.sciencedirect.com/science/article/abs/pii/S0167577X19313795</a>
<b>Abstract</b>	In this work, hematite ( $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> ) nanoparticles (NPs) were synthesized by co-precipitation method involving chemical precipitation of aqueous salts of iron (Fe <sup>2+</sup> /Fe <sup>3+</sup> ) using NaOH aqueous solution. The synthesis of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> NPs via phase transformation and its photocatalytic application under ultra violet (UV) light is rarely reported. The maximum removal of methylene blue (MB) dye (92%) was achieved at pH 10 and 200 mg amount of catalyst, whereas the concentration of dye was 10 ppm. The removal percentage of MB dye was found to vary with pH of the solution, concentrations of dye, and amount of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> NPs for certain interval of time. Moreover, plot of $\ln(C_t/C_0)$ Vs time exhibited almost a linear relationship between them which suggested the pseudo-first order kinetics reaction of photocatalytic degradation of MB.

2019-2020
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<b>Paper Title</b>	Influence of polymer washing on thermal conductivity enhancement of Cu nanofluids
<b>Journal Name</b>	<u>Asia-pacific journal of chemical engineering</u>
<b>Link of the paper</b>	<a href="https://onlinelibrary.wiley.com/doi/abs/10.1002/apj.2501">https://onlinelibrary.wiley.com/doi/abs/10.1002/apj.2501</a>
<b>Abstract</b>	This work aims at enhancing the thermal conductivity of base fluids (water and methanol) through successive washing of polymers from the surface of polyvinylpyrrolidone (PVP)- stabilized copper (Cu) nanoparticles. Cu nanofluids were successfully synthesized and characterized using transmission electron microscope and UV-vis spectrophotometer. Thermal conductivity of freshly prepared Cu nanofluid shows ~10% enhancements. The poor enhancement in thermal conductivity is due to the presence of thick polymer coating on the surface of nanoparticles. A new technique has been developed to erode the polymers from the nanoparticle surface by repeated washing and redispersion. After one-time washing and redispersion, the thermal conductivity of nanofluid has been increased to 0.732 W/mK (~22% enhancements). Greater enhancement (~30.34%) has been achieved after three times continuous washing and redispersion. Finally, the experimental values of thermal conductivity were compared and validated against the existing Maxwell effective model.

2019-2020	
<b>Paper Title</b>	Fe <sub>3</sub> O <sub>4</sub> nanoparticles decorated multi-walled carbon nanotubes based magnetic nanofluid for heat transfer application
<b>Journal Name</b>	<u>Materials Letters</u>
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0167577X20307485">https://www.sciencedirect.com/science/article/abs/pii/S0167577X20307485</a>



<b>Abstract</b>	<p>The synthesis of magnetic multi-walled carbon nanotubes (MWCNTs)-iron oxide (<math>\text{Fe}_3\text{O}_4</math>) nanocomposite (NC) provides many interesting traits in individual moieties unfolding new opportunities for a wide range of applications. Several preparation techniques have been employed in the recent past to synthesize MWCNTs-<math>\text{Fe}_3\text{O}_4</math> NCs. Herein, we report the synthesis of <math>\text{Fe}_3\text{O}_4</math> nanoparticles (NPs) decorated MWCNTs NC for heat transfer application. The NC was synthesized via co-precipitation method with a high-quality yield. The magnetic characterization of the as-synthesized NC exhibited saturation magnetization and was found to be 34.86 emu/g. Finally, magnetic nanofluids were prepared by dispersing different amounts of the as-synthesized NC into mineral oil, which is rarely reported. A ~50% enhancement in the thermal conductivity of the magnetic nanofluid was observed with loading of ~0.5 g/L of NC, which is better than the results reported so far for various nanofluids.</p>
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2019-2020	
<b>Paper Title</b>	Structural, optical and photoluminescence investigations of nanocrystalline CuO thin films at different microwave powers
<b>Journal Name</b>	Optical and quantum electronics
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s11082-020-02535-x">https://link.springer.com/article/10.1007/s11082-020-02535-x</a>
<b>Abstract</b>	<p>Thin films of copper oxide were prepared through two steps: the formation of metallic copper thin films by DC sputtering technique and oxidizing the metallic copper films through microwave plasma chemical vapor deposition technique. X-ray diffraction (XRD) and field emission scanning electron microscope (FESEM) were used to detect the crystalline phases and the films morphology, respectively. Tenorite CuO phase with interlocking between grains were observed and detected. Optical and photoluminescence properties were investigated by UV-Vis-NIR to detect</p>



	the optical transparency, optical band gap, and refractive index of the prepared films. The optical transmittance of the studied films was resolved by Swanepoel's procedure due to the presence of the optical interference in such samples. The optical band gap values were observed to decrease from 2.355 to 1.986 eV as the microwave power increase. A strong UV emission at around 358 nm was observed in all CuO samples. Moreover, weak blue and green emission were also observed in the photoluminescence spectra.
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2020-2021	
<b>Book Chapter Title</b>	Inorganic Nanostructures for Brain Tumor Management
<b>Publisher Name</b>	Springer
<b>Link of the paper</b>	<a href="https://link.springer.com/protocol/10.1007/978-1-0716-1052-7_6">https://link.springer.com/protocol/10.1007/978-1-0716-1052-7_6</a>
<b>Abstract</b>	The nanoparticles have been widely investigated as therapeutic agents for cancer treatments in biomedical fields due to their unique physical/chemical properties, versatile synthetic strategies, easy surface functionalization, and excellent biocompatibility. Even though the advancement of certain treatment techniques is available for the diagnosis of the tumor, still the blood-brain barrier is the obstruction to the delivery of drug molecules to the tumor cells in the central nervous system (CNS) and brain parenchyma. Though nano-enabled therapies make promise to deliver the anticancer drugs to cross the blood-brain barrier (BBB). This chapter focuses on the synthesis techniques and advanced characterization techniques adopted to design and develop inorganic nanostructures. Various inorganic nanostructure-based cancer therapeutic agents, including gold nanoparticles, magnetic nanoparticles, carbon nanotube, earth metal oxide nanoparticles, and other nanostructures, have also been discussed. Related challenges with this research area and future prospect are also discussed herein.



2020-2021	
<b>Paper Title</b>	Carbon-coated Fe <sub>3</sub> O <sub>4</sub> core-shell super-paramagnetic nanoparticle-based ferrofluid for heat transfer applications
<b>Journal Name</b>	<u>Nanoscale Advances</u>
<b>Link of the paper</b>	<a href="https://pubs.rsc.org/en/content/articlehtml/2021/na/d1na00061f">https://pubs.rsc.org/en/content/articlehtml/2021/na/d1na00061f</a>
<b>Abstract</b>	<p>Herein, we report the investigation of the electrical and thermal conductivity of Fe<sub>3</sub>O<sub>4</sub> and Fe<sub>3</sub>O<sub>4</sub>@carbon (Fe<sub>3</sub>O<sub>4</sub>@C) core-shellnanoparticle (NP)-basedferrofluids. Differentsized Fe<sub>3</sub>O<sub>4</sub> NPsweresynthesized <i>via</i> a chemicalco-precipitationmethodfollowed by carboncoating as a shell over the Fe<sub>3</sub>O<sub>4</sub> NPs <i>via</i> the hydrothermal technique. The averageparticle size of Fe<sub>3</sub>O<sub>4</sub> NPs and Fe<sub>3</sub>O<sub>4</sub>@C core-shellNPswasfound to be in the range of ~5–25 nm and ~7–28 nm, respectively. The thickness of the carbonshell over the Fe<sub>3</sub>O<sub>4</sub> NPswasfound to be in the range of ~1–3 nm. The magneticcharacterizationrevealedthat the as-synthesizedsmallaverage-sized Fe<sub>3</sub>O<sub>4</sub> NPs (<i>ca.</i> 5 nm) and Fe<sub>3</sub>O<sub>4</sub>@C core-shellNPs (<i>ca.</i> 7 nm) weresuperparamagnetic in nature. The electrical and thermal conductivities of Fe<sub>3</sub>O<sub>4</sub> NPs and Fe<sub>3</sub>O<sub>4</sub>@C core-shell NP-basedferrofluidsweremeasuredusingdifferent concentrations of NPs and withdifferentsizedNPs. Exceptionalresultswereobtained, where the electricalconductivitywasenhanced up to ~3222% and ~2015% for Fe<sub>3</sub>O<sub>4</sub> (<i>ca.</i> 5 nm) and Fe<sub>3</sub>O<sub>4</sub>@C core-shell (<i>ca.</i> 7 nm) NP-basedferrofluidscompared to the base fluid, respectively. Similarly, an enhancement in the thermal conductivity of ~153% and ~116% wasrecorded for Fe<sub>3</sub>O<sub>4</sub> (<i>ca.</i> 5 nm) and Fe<sub>3</sub>O<sub>4</sub>@C core-shell (<i>ca.</i> 7 nm) NPs,</p>



	<p>respectively. The exceptional enhancement in the thermal conductivity of the bare <math>\text{Fe}_3\text{O}_4</math> NP-based ferrofluid compared to that of the <math>\text{Fe}_3\text{O}_4</math>@C core-shell NP-based ferrofluid was due to the more pronounced effect of the chain-like network formation/clustering of bare <math>\text{Fe}_3\text{O}_4</math> NPs in the base fluid. Finally, the experimental thermal conductivity results were compared and validated against the Maxwell effective model. These results were found to be better than results reported till date using either the same or different material systems.</p>
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2020-2021	
<b>Paper Title</b>	Thermal conductivity enhancement for CuO nanoflakes in oil- based and oil blend- based nanofluids
<b>Journal Name</b>	<u>Journal of the Chinese chemical society</u>
<b>Link of the paper</b>	<a href="https://onlinelibrary.wiley.com/doi/abs/10.1002/jccs.202100005">https://onlinelibrary.wiley.com/doi/abs/10.1002/jccs.202100005</a>
<b>Abstract</b>	<p>We report the synthesis and characterization of copper oxide (CuO) nanoflakes (Nflks) for thermal conductivity analysis. The synthesized Nflks were used for the preparation of oil- based and oil blend- based nanofluids. A dynamic light scattering study was carried out for aqueous suspension of CuO Nflks. The size distribution data show the two peaks emerged at <math>178.2 \pm 31.77</math> nm and <math>861.7 \pm 248.6</math> nm. The zeta potential was investigated, and the peak was observed at <math>-46.4 \pm 14.3</math> mV. The average thermal conductivity coefficients were calculated for mineral oil, sunflower oil, and oil blend, which were found to be 0.086, 0.105, and 0.099 W/mK, respectively. Furthermore, thermal conductivity enhancement was calculated, and the maximum percent enhancement was recorded for sunflower oil- based nanofluid, which was found to be <math>\sim 20.68\%</math> at 0.46 vol%. At similar vol%, the enhancement in thermal conductivity in oil blend- based and</p>



	mineraloil- basednanofluidswasfound to be 16.14 and 15.73%, respectively. The oil- basednanofluids are promising in electronics and modern computationaldevices to minimize the heatingeffect.
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2020-2021	
<b>Paper Title</b>	Impact of the Microwave Power on the Structural and Optical Properties of Nanocrystalline Nickel Oxide Thin Films
<b>Journal Name</b>	<u>Brazilian journal of physics</u>
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s13538-021-00891-x">https://link.springer.com/article/10.1007/s13538-021-00891-x</a>
<b>Abstract</b>	Nanocrystalline nickel oxide thin films wereprepared by combined techniques of direct currentspattering (DC sputtering) and microwave plasma chemicalvapordeposition to perform high-quality films. The prepared films weresubjected to threedifferentmicrowavepowers at 400, 800, and 1200 W. The structural and morphologicalproperties of the prepared films wereinvestigated by X-ray diffraction (XRD) and fieldemission scanning electron microscope (FESEM). The prepared films have a trigonal structure. The crystallite size wascalculatedfromScherer's formula and uniformdimensional model (UDM). The calculated size increasedfrom 213 to 241 Å as the microwave power increasesfrom 400 to 1200 W, respectively. The latticestrainwasalsocalculatedfrom UDM model, and ithad a lower value of $1.8 \times 10^{-3}$ at 800 W. The opticalproptertiessuch as transmittance, reflectance, absorption coefficient, extinction coefficient, and the

	dispersion were investigated. The optical transition of such films was direct transition, and the optical band gap values were observed to decrease from 3.950 to 3.367 eV as the microwave power increase from 400 to 1200 W, respectively. The refractive index and the dispersion energy parameters were studied in detail, and the static and lattice dielectric constant were deduced.
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2020-2021	
<b>Paper Title</b>	Colloidal Fe <sub>3</sub> O <sub>4</sub> nanoparticles-based oil blend ferro-nanofluid for heat transfer application
<b>Journal Name</b>	<u>European physical journal plus</u>
<b>Link of the paper</b>	<a href="https://epjplus.epj.org/articles/epjplus/abs/2021/07/13360_2021_Article_1711/13360_2021_Article_1711.html">https://epjplus.epj.org/articles/epjplus/abs/2021/07/13360_2021_Article_1711/13360_2021_Article_1711.html</a>
<b>Abstract</b>	The thermal conductivity enhancement of oil blend-based ferro-nanofluids for heat transfer application is rarely reported. Herein, highly stable ferro-nanofluids were prepared by dispersing oleic acid coated Fe <sub>3</sub> O <sub>4</sub> NPs into the blend of sunflower oil and mineral oil at varying volume ratios. The maximum thermal conductivity enhancement of ~91% was obtained for M10 (base fluid) oil blend-based ferro-nanofluid at 0.6 vol% of Fe <sub>3</sub> O <sub>4</sub> NPs as compared to the pure mineral oil. The dispersed NPs into the oil blend-based ferro-nanofluid executed Brownian motion which led to the collisions between the NPs as well as with the molecules of the oil blend. The formation of a chain like network by small-sized NPs effectively led to a larger volume fraction of NPs, which caused the enhancement of the thermal conductivity of oil blend-based ferro-nanofluids. Moreover, a nano-adsorption layer of oil blend was formed on the surfaces of NPs, which served as a bridge for the heat exchange between NPs and oil blend. The experimental results were validated against a similar pre-existing thermal



conductivity enhancement model. Hence, this study provides a more efficient method to prepare oil-based ferro-nanofluids with a tunable thermal conductivity for heat transfer applications.

2020-2021	
<b>Paper Title</b>	Systematic exploration of electrospun polyvinylidene fluoride (PVDF)/multi-walled carbon nanotubes' (MWCNTs) composite nanofibres for humidity sensing application
<b>Journal Name</b>	<u>Journal of Taibah University for Science</u>
<b>Link of the paper</b>	<a href="https://www.tandfonline.com/doi/full/10.1080/16583655.2021.1964232">https://www.tandfonline.com/doi/full/10.1080/16583655.2021.1964232</a>
<b>Abstract</b>	In this paper, the electrospinning technique was used to obtain multi-walled carbon nanotubes (MWCNTs) supported on electrospun polyvinylidene fluoride (PVDF) nanofibres (NFs) (PVDF/MWCNTs), a composite-based mat of NFs. The surface morphology of the PVDF/MWCNTs NFs was analysed by a field effect scanning electron microscope. The thickness of the NFs mat varies with the time and concentration of MWCNTs. The contact angle (CA) measurement shows that 2.5 wt% of MWCNTs in NF mat shows 61° CA which suggests the hydrophilic nature of the prepared NF mat. Fourier transform infrared and Raman spectroscopy revealed the implantation of MWCNTs in PVDF matrix and side wall attachment with polymer chain. X-ray diffraction and FTIR studies show that as the MWCNT content increases, the $\alpha$ -phase in PVDF decreases, indicating that



	MWCNT has a strong effect on phase transformation. Consequently, the NFs show an almost linear capacitive response. They showed that the high-capacitive changes in PVDF/MWCNTs' NFs are achieved at 2.5 wt% MWCNTs' addition at different humidity levels. The sensitivity of the PVDF/MWCNTs' (2.5 wt%) NF mat-based capacitive sensor exhibits high sensitivity $\sim 0.71 \text{ pF}/\% \text{RH}$ . Hence, PVDF/MWCNTs' NFs perform attention-grabbing properties for the humidity sensing application.
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2020-2021	
<b>Paper Title</b>	Advanced biomedical applications of iron oxide nanostructures based ferrofluids
<b>Journal Name</b>	<u>Nanotechnology</u>
<b>Link of the paper</b>	<a href="https://iopscience.iop.org/article/10.1088/1361-6528/ac137a/meta">https://iopscience.iop.org/article/10.1088/1361-6528/ac137a/meta</a>
<b>Abstract</b>	Ferrofluids or magnetic nanofluids are highly stable colloidal suspensions of magnetic nanoparticles (NPs) dispersed into various base fluids. These stable ferrofluids possess high thermal conductivity, improved thermo-physical properties, higher colloidal stability, good magnetic properties, and biocompatibility, which are the primary driving forces behind their excellent performance, and thus enable them to be used for a wide range of practical applications. The most studied and advanced ferrofluids are based on iron oxide nanostructures especially NPs, because of their easy and large-scale synthesis at low costs. Although in the last decade, several



	<p>review articles are available on ferrofluids but mainly focused on preparations, properties, and a specific application. Hence, a collective and comprehensive review article on the recent progress of iron oxide nanostructures based ferrofluids for advanced biomedical applications is undeniably required. In this review, the state of the art of biomedical applications is presented and critically analyzed with a special focus on hyperthermia, drug delivery/nanomedicine, magnetic resonance imaging, and magnetic separation of cells. This review article provides up-to-date information related to the technological advancements and emerging trends in iron oxide nanostructures based ferrofluids research focused on advanced biomedical applications. Finally, conclusions and outlook of iron oxide nanostructures based ferrofluids research for biomedical applications are presented.</p>
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2020-2021	
<b>Paper Title</b>	A facile co-precipitation synthesis of novel $\text{WO}_3/\text{NiWO}_4$ nanocomposite with improved photocatalytic activity
<b>Journal Name</b>	<u>Materials science in semiconductor processing</u>
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S1369800121003176">https://www.sciencedirect.com/science/article/abs/pii/S1369800121003176</a>
<b>Abstract</b>	Herein, we are presenting the synthesis of pure $\text{WO}_3$ nanoparticles (NPs) and $\text{WO}_3/\text{NiWO}_4$ <u>nanocomposites</u> (NCs) with improved <u>photocatalytic activities</u> via a simple co-precipitation process. Structural, morphological, and



	<p>compositional studies approved the synthesis of the nanocomposite. Furthermore, XPS analysis confirm the chemical composition and incorporation of Ni in the final products. The <u>Scherrer equation</u> used to determine the <u>crystallite size</u> and noticed that it reduced from 34 to 21 nm on Ni added in <math>WO_3</math> and also FESEM study give the <u>average grain size</u> of NPs around 30 nm. <u>HRTEM</u> and <u>SAED</u> studies reveals the nanocomposite phase with lattice spacing of <math>\sim 0.37</math> nm, and <math>\sim 0.29</math> nm, which is perfectly matched with (020) of <math>WO_3</math> and (111) of <math>NiWO_4</math>, respectively. FTIR analysis reveals the functional groups of the formation of <math>WO_3/NiWO_4</math> NCs. Diffused reflectance spectroscopy was employed to determine the energy gap (<math>E_g</math>) through Kubelka-Munk relation and noticed that the <math>E_g</math> value is reduced from 2.61 to 2.49 eV. PL emission analysis was done under 280 nm excitation and possess the intense emission peaks at 361, 383, 412, and 492 nm, among them 383 nm is high intense, which is originated from near band edge transition. The photocatalytic degradation of <u>Methylene blue</u> (MB) dye was investigated under UV light. The percent degradation of MB dye was observed to be <math>\sim 70.83\%</math>, <math>71.88\%</math>, <math>76.39\%</math>, <math>86.81\%</math> and <math>90.63\%</math> for pure <math>WO_3</math>, 5 wt% Ni, 10 wt% Ni, 15 wt% Ni and 20 wt% Ni nanocomposites, respectively. The maximum percent <u>photodegradation</u> of MB dye has been done <math>\sim 90.63\%</math> for 20 wt% Ni within 80 min of duration. These outcomes revealed that the prepared <math>WO_3/NiWO_4</math> NCs will be highly applicable for hazardous MB dye degradation.</p>
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2020-2021	
<b>Paper Title</b>	Active adsorption performance of planetary ball milled Saudi Arabian bentonite clay for the removal of copper ions from aqueous solution
<b>Journal Name</b>	<u>Euromphysics letters EPL</u>



<b>Link of the paper</b>	<a href="https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta">https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta</a>
<b>Abstract</b>	<p>We report the role of local bentonite clay in the removal of <math>\text{Cu}^{2+}</math> ions from aqueous solution. The fine bentonite clay powder was analysed by XRD, FTIR, SEM and DLS analysis techniques. Further, the adsorption experiments were carried out by varying many factors such as weight and size of bentonite clay, residence time, <math>\text{pH}</math> of the solution, stirring rate, temperature, and flow rate. The optimum conditions for effective removal of <math>\text{Cu}^{2+}</math> ions was 1 g dose of bentonite and 63 <math>\mu\text{m}</math> size of bentonite, 50 minutes of residence time and 50 <math>^{\circ}\text{C}</math> temperature at <math>\text{pH}</math> 3 with a flow rate of 1 L/min. The data fitted well the Freundlich model and a maximum adsorption capacity of 61.72 mg/g has been obtained. The value of Gibbs free energy changes (<math>\Delta G^{\circ}</math>), enthalpy changes (<math>\Delta H^{\circ}</math>) and entropy changes (<math>\Delta S^{\circ}</math>) were found to be <math>-3819.86 \text{ J mol}^{-1}\text{K}^{-1}</math>, <math>+15079.10 \text{ J mol}^{-1}\text{K}^{-1}</math> and <math>+58.60 \text{ J mol}^{-1}\text{K}^{-1}</math>, respectively.</p>

2020-2021	
<b>Paper Title</b>	Highly photocatalytic active r-GO/ $\text{Fe}_3\text{O}_4$ nanocomposites development for enhanced photocatalysis application: A facile low-cost preparation and characterization
<b>Journal Name</b>	<u>Ceramics International</u>



Link of the paper	<a href="https://www.sciencedirect.com/science/article/pii/S027288422102455X">https://www.sciencedirect.com/science/article/pii/S027288422102455X</a>
Abstract	<p>This research explores reduced graphene oxide-Fe<sub>3</sub>O<sub>4</sub> nanocomposites synthesis, characterization, and its ability to degrade methylene blue dye using sodium lamp as the visible white light source. The modified co-precipitation method was employed for the synthesis of the <u>photocatalyst</u>. The photocatalyst was further characterized by various characterization techniques. Moreover, photocatalytic activity was performed by varying performance conditions, and analyzed the results. It was found that photocatalyst has highly active performance at the working conditions of pH 12 with 50 mg catalyst for 10 ppm methylene blue dye solutions and produced 98.3% degradation of the dye within 80 min. It was also observed that minor positive performance was observed on varying temperature and catalyst concentration. The photocatalytic activity was found highly dependent on the pH of the solution and increased with an increase in pH. Additional studies were also performed by adding some amount of hydrogen peroxide in the solution without changing its pH. It was also noted that as the amount of hydrogen peroxide was increased in the solution, there was an increment in the degradation of the dye. A maximum of 98.8% degradation was recorded with the 9 ml addition of hydrogen peroxide-containing 25 mg catalyst, pH 8, and at 40 °C reaction temperature within 70 min of irradiation.</p>

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Scopus

<https://www.scopus.com/dashboard.uri>

**Faculty Name: Mohamed Ahmed Mahmoud**

**2019-2020**



<b>Paper Title</b>	<a href="#">Removal and recovery of U(VI) from aqueous effluents by flax fiber: Adsorption, desorption and batch adsorber proposal</a>
<b>Journal Name</b>	Journal of Advanced Research
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S2090123219301699">https://www.sciencedirect.com/science/article/pii/S2090123219301699</a>
<b>Abstract</b>	Flax fiber (Linen fiber), a valuable and inexpensive material was used as sorbent material in the uptake of uranium ion for the safe disposal of liquid effluent. Flax fibers were characterized using BET, XRD, TGA, DTA and FTIR analyses, and the results confirmed the ability of flax fiber to adsorb uranium. The removal efficiency reached 94.50% at pH 4, 1.2 g adsorbent dose and 100 min in batch technique. Adsorption results were fitted well to the Langmuir isotherm. The recovery of U (VI) to form yellow cake was investigated by precipitation using $\text{NH}_4\text{OH}$ (33%). The results show that flax fibers are an acceptable sorbent for the removal and recovery of U (VI) from liquid effluents of low and high initial concentrations. The design of a full scale batch unit was also proposed and the necessary data was suggested.

2019-2020	
<b>Paper Title</b>	Uranium (VI) ions uptake from liquid wastes by solanum incanum leaves: biosorption, desorption and recovery
<b>Journal Name</b>	Alexandria Engineering Journal



<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S1110016820301125">https://www.sciencedirect.com/science/article/pii/S1110016820301125</a>
<b>Abstract</b>	<p>Solanum incanum leaves, new and valuable biomass were utilized as sorbent material for the removal of U (IV) ions from aqueous wastes. The leaves of solanum incanum were analyzed by SEM, XRD, EDS and FTIR analyses. Solanum incanum leaves have a good ability to (VI) uptake. The maximum biosorption capacity of SNL was 39.98 mg/g at pH 4 and 45 °C. 99.95% of U (VI) ions were biosorbed within 60 min in an endothermic (<math>\Delta H: 167.267 \text{ KJ mol}^{-1}</math>) batch system. The linear and nonlinear results of biosorption isotherms and kinetics indicate that Langmuir and second pseudo order models were an agreement with the experimental results. Also, the regeneration and reusing of biomass give acceptable results up to 8 cycles of the biosorption-desorption system.</p>



2019-2020	
<b>Paper Title</b>	Oil spill cleanup by raw flax fiber: Modification effect, sorption isotherm, kinetics and thermodynamics
<b>Journal Name</b>	Arabian Journal of Chemistry
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S1878535220300605">https://www.sciencedirect.com/science/article/pii/S1878535220300605</a>
<b>Abstract</b>	<p>Modification of raw flax fiber by acetylating process and microwave energy was useful in the application of oil spill cleanup. The change in fibers was characterized by scientific analysis (FTIR, SEM, XRD and contact angle). The results indicate that the modified fibers by the acetylating process have extra hydrophobic properties than both microwave radiation and raw fibers. Oil/Artificial seawater (3.5% salinity by NaCl) system (O/W-S) was used as a liquid phase operation system. Fast oil sorption was reached at 6 min and attained (equilibrium) at 10 min. Acetylated fiber (ACF) has higher oil sorption capacity (24.54 g/g) than both raw (13.75 g/g) and microwave fiber (17.42 g/g) with exothermic effect. The sorption kinetics and isotherms indicate that the oil sorption onto ACF agreement with pseudo second-order kinetic model and Freundlich isotherm model. Also, the economic reusing of fiber was evaluated. The process of acetylation demonstrated the ability to improve the absorptive properties of the fibers, which makes them able to compete with synthetic fibers in the oil spill cleanup and industrial applications, as well as cheap and eco-friendly due to their biodegradation</p>



2020-2021	
<b>Paper Title</b>	Preparation magnetic nanomaterial for U (VI) uptake from the aqueous solution
<b>Journal Name</b>	<u>Journal of Saudi Chemical Society</u>
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S1319610321000193">https://www.sciencedirect.com/science/article/pii/S1319610321000193</a>
<b>Abstract</b>	Nanocomposite of magnetite-silica ( $\text{Fe}_3\text{O}_4@\text{SiO}_2$ ) was synthesized and walled with a shell of 5,7-dihydroxy-4-methylcoumarin (DHMC). The prepared dihydroxy-4-methylcoumarin magnetite-silica nanocomposite (DHMC-M-SNC) was used in the uranium uptake from the liquid phase in a batch system. The structure of DHMC-M-SNC was investigated by BET, XRD and FTIR analyses. DHMC-M-SNC appeared maximum sorption capacity reached 66.43 mg/g at 30 min and pH 5. The U (VI) sorption system onto DHMC-M-SNC was favorable at low temperature (Exothermic nature) and fitted well with Langmuir ( $R^2 = 0.997$ ) and pseudo-second-order models ( $R^2 = 0.989$ ). Also, recycling of DHMC-M-SNC shows a potential recycle up to 8 cycles. The results show that the prepared nanocomposite can be utilized as an operative sorbent in the U (VI) sorption from the liquid phase.



2020-2021	
<b>Paper Title</b>	Separation of U (VI) ions from the aqueous phase onto polyphenol silica nanocomposite in the batch adsorption system
<b>Journal Name</b>	Alexandria Engineering Journal
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S1110016821001332">https://www.sciencedirect.com/science/article/pii/S1110016821001332</a>
<b>Abstract</b>	The chemical modified silica nanoparticles with a polyphenol compound were synthesized as a sorbent nanocomposite for U (VI) removal from the aqueous phase. The prepared Pyrogallol silica nanocomposite (PSCN) was described by some specific analysis. The experiments were carried out in a batch system. The maximum sorption capacity of the nanocomposite reached 58.45 mg/g at optimum operating conditions (sorption time 50 min, pH 5, dose 0.2 g, 100 mg/l of U (VI) and 30 °C). The sorption procedure was an exothermic system and the results were in good agreement with pseudo-second-order ( $R^2 > 99$ ) and Langmuir isotherm ( $R^2 > 97$ ). Regeneration and recycling studies indicate that the prepared nanocomposite has good effectiveness for up to five cycles.



2020-2021	
<b>Paper Title</b>	Separation of Cd (II) from aqueous solution by keratin magnetic froth carbon in the batch and continuous system
<b>Journal Name</b>	Chemical Engineering Research and Design
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0263876221001775">https://www.sciencedirect.com/science/article/abs/pii/S0263876221001775</a>
<b>Abstract</b>	Removal uptake of cadmium Cd (II) from aqueous solution using keratin magnetic froth carbon (KMFC) prepared from molasses of the sugarcane industry was studied in the batch and column system. KMFC was characterized by Scanning electron microscope (SEM), Brunauer-Emmett-Teller (BET), Fourier-transform infrared spectroscopy (FTIR), X-ray Photo-electron Spectroscopy (XPS) analyses. In the batch system, the maximum sorption capacity (198.80 mg/g) was obtained at pH 5 and equilibrium sorption time (80 min) and the sorption results are well-fitting with Freundlich and pseudo-second-order models. Whereas the maximum removal efficiency (65%) with sorption capacity (236.2 mg/g) was obtained at column operational circumstances of 15 mL/min flow rate, 6 cm bed depth and 100 mg/L Cd (II) concentration. The higher values of $R^2 > 0.98$ with relatively lesser values of Error analysis $EA \leq 0.66 \times 10^{-3}$ indicated a well-fitting of the Thomas model with the experimental sorption outcomes than Adams-Bohart and Yoon-Nelson kinetic models. Renewal and recycling of KMFC indicate that KMFC has a reputable efficiency of up to 7 cycles.



2020-2021	
<b>Paper Title</b>	Batch and column modeling of Cd (II) separation from aqueous phase using chitosan nitrogen foam carbon
<b>Journal Name</b>	Environmental Nanotechnology, Monitoring & Management
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S2215153221000696">https://www.sciencedirect.com/science/article/abs/pii/S2215153221000696</a>
<b>Abstract</b>	<p>Beet molasses resulting from the sugar industry was mixed with keratin solution to prepare nitrogen foam carbon (N-PC) by carbonization. Amino functional groups were introduced to N-PC by coating with a chitosan layer to produce chitosan nitrogen foam carbon (CH- N-PC). The structure of CH- N-PC was characterized and used as an adsorbent in the column and batch sorption system to separate Cd (II) from the aqueous phase. In the column system, the maximum removal was reached 77.30% with a sorption capacity of 133.22 mg/g at optimum pH.5.0. Thomas model indicates a well-fitting with higher <math>R^2 &gt; 0.98</math> than other models. In the batch system indicated a well-fitting with Pseudo-second-order model (<math>R^2 &gt; 0.998</math>) with agreement between experimental (<math>q_e</math>: 219.45 mg/g) and calculated sorption capacity (<math>q_e</math>: 222.64 mg/g) than other models. The batch thermodynamic study showed that the sorption system is an exothermic process. CH-N-PC adsorbent has good regeneration with 2.0 M HCl and recycled up to 5 cycles which indicates the economical use of CH-N-PC in the Cd (II) column sorption system.</p>



2020-2021	
<b>Paper Title</b>	Sorption of U(VI) ions from aqueous solution by eggplant leaves: Isotherm, kinetics and thermodynamics studies
<b>Journal Name</b>	Progress in Nuclear Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0149197021001943">https://www.sciencedirect.com/science/article/abs/pii/S0149197021001943</a>
<b>Abstract</b>	<p>The research aims to utilize eggplant (<i>Solanum melongena</i>) leaves to remove and recover U(VI) ions from aqueous solutions. The biomass was characterized by SEM, FTIR and EDS analyses. Eggplant leaves appeared a maximum U(VI) uptake up to 99.87% with sorption capacity: 110.97mg/g at pH 5, 0.09 g dose, 28°C and 50 min in the batch sorption system. The nonlinear assessment of isotherm and kinetics showed that the sorption system was fitted well by the Freundlich model and the pseudo first-order kinetic model. Also, the thermodynamic study displayed an exothermic of the uptake process. Likewise, the sorption-desorption cycle showed the good stability of eggplant leaves structure up to 9 cycles. The high adsorption capacity, low cost, good stability and biodegradable properties of eggplant leaves make it a good adsorbent for removing and recovering U(VI) ions from aqueous solutions.</p>



2020-2021	
<b>Paper Title</b>	Performance evaluation of <i>Solanum incanum</i> leaves as a biodegradable adsorbent for oil-spill cleanup in seawater
<b>Journal Name</b>	Desalination and Water Treatment Journal
<b>Link of the paper</b>	<a href="https://www.deswater.com/DWT_abstracts/vol_233/233_2021_182.pdf">https://www.deswater.com/DWT_abstracts/vol_233/233_2021_182.pdf</a>
<b>Abstract</b>	<p>Leaves of <i>Solanum incanum</i> were used as oil adsorbent biomass in oil sorption from seawater. The capability of biomass to eliminate oil from seawater was related to its surface structure. The parameters of spilled oil ratio, sorption time, biomass dose, and the temperature of the oil/seawater system were studied. Maximum oil sorption capacity (11.54 g/g) was obtained at 4min and room temperature (28°C). The best fitting of Redlich-Peterson and Langmuir isotherm corroborates the homogeneous monolayer oil sorption process onto sorption sites of biomass rather than heterogeneous multilayer oil sorption. Pseudo-first-order kinetic model (<math>R^2</math>: 0.97941 and <math>\chi^2</math>: 0.27082) provided good fitting compared to pseudo-second order (<math>R^2</math>: 0.95173 and <math>\chi^2</math>: 0.63476) and Intraparticle Diffusion models (<math>R^2</math>: 0.76666 and <math>\chi^2</math>: 3.06843), indicating the physical nature of oil sorption onto biomass. Moreover, the reusability results demonstrate acceptable sorption effectiveness of <i>Solanum</i> leaves up to three sorption cycles.</p>



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**Scopus link**

<https://www.scopus.com/authid/detail.uri?authorId=56549489500>



Faculty Name: Dr. Omer Yahya Bakaher

2019-2020	
<b>Paper Title</b>	Adsorption of benzene on impregnated carbon nanotubes
<b>Journal Name</b>	Ain Shams Engineering Journal
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.asej.2020.03.012">https://doi.org/10.1016/j.asej.2020.03.012</a>
<b>Abstract</b>	Multi-walled carbon nanotubes impregnated with $\text{Fe}_2\text{O}_3$ nanoparticles were prepared. The multi-walled carbon nanotubes were used to remove benzene from water. The iron-impregnated carbon nanotubes from a range 5 wt% iron to 20 wt% iron were prepared. The removal of benzene increases with the increase of impregnated iron percent in the multi-walled carbon nanotube. Redlich-Peterson model gives better data representation. Maximum adsorption capacity of impregnated CNTs was found to be 271 mg/g. The highest adsorption capacity of carbon nanotubes impregnated by iron nanoparticles confirms a good possibility to be an excellent adsorbent compared to others adsorbents to remove benzene from water.



2019-2020	
<b>Paper Title</b>	Uranium (VI) ions uptake from liquid wastes by solanum incanum leaves: biosorption, desorption and recovery
<b>Journal Name</b>	Alexandria Engineering Journal
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.aej.2020.03.013">https://doi.org/10.1016/j.aej.2020.03.013</a>
<b>Abstract</b>	Solanum incanum leaves, new and valuable biomass were utilized as sorbent material for the removal of U (IV) ions from aqueous wastes. The leaves of solanum incanum were analyzed by SEM, XRD, EDS and FTIR analyses. Solanum incanum leaves have a good ability to (VI) uptake. The maximum biosorption capacity of SNL was 39.98 mg/g at pH 4 and 45 °C. 99.95% of U (VI) ions were biosorbed within 60 min in an endothermic (DH:167.267 KJ mol <sup>-1</sup> ) batch system. The linear and nonlinear results of biosorption isotherms and kinetics indicate that Langmuir and second pseudo order models were an agreement with the experimental results. Also, the regeneration and reusing of biomass give acceptable results up to 8 cycles of the biosorption-desorption system.



2019-2020	
<b>Paper Title</b>	Preparation and application of Poly (N-formylpiperidine) in the adsorption of Pb(II) from liquid phase
<b>Journal Name</b>	Ain Shams Engineering Journal
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.asej.2020.01.014">https://doi.org/10.1016/j.asej.2020.01.014</a>
<b>Abstract</b>	<p>Poly (N-formylpiperidine) (P (N-FPP)) was prepared by copolymerizing N-formylpiperidine and benzaldehyde. Characterization of P (N-FPP) was determined by SEM, FTIR, XRD and BET analysis. Poly (N-formylpiperidine) has the acceptable adoptive uptake of Pb (II) ions from the liquid phase using a continuous column system. Column parameters (pH, initial concentration, bed height, temperature, and flow rate) were studied. The continuous system was evaluated by two kinetic models (Thomas and Adams-Bohart models). The maximum Pb(II) adsorption capacity 3.8325 mg/g was obtained at pH 4, flow rate 2 ml/min and 30 °C. Also, kinetic data showed that the Thomas model had better convenience (<math>R^2 = 998</math>) than the Adams-Bohart model (<math>R^2 = 891</math>). Finally, the regeneration process indicates that the P (N-FPP) had a good efficiency for 4 adsorption cycles.</p>



2019-2020	
<b>Paper Title</b>	Removal and recovery of U(VI) from aqueous effluents by flax fiber: adsorption, desorption and batch adsorber proposal
<b>Journal Name</b>	Journal of Advanced Research
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.jare.2019.10.011">https://doi.org/10.1016/j.jare.2019.10.011</a>
<b>Abstract</b>	Flax fiber (Linen fiber), a valuable and inexpensive material was used as sorbent material in the uptake of uranium ion for the safe disposal of liquid effluent. Flax fibers were characterized using BET, XRD, TGA, DTA and FTIR analyses, and the results confirmed the ability of flax fiber to adsorb uranium. The removal efficiency reached 94.50% at pH 4, 1.2 g adsorbent dose and 100 min in batch technique. Adsorption results were fitted well to the Langmuir isotherm. The recovery of U (VI) to form yellow cake was investigated by precipitation using NH <sub>4</sub> OH (33%). The results show that flax fibers are an acceptable sorbent for the removal and recovery of U (VI) from liquid effluents of low and high initial concentrations. The design of a full scale batch unit was also proposed and the necessary data was suggested.



2020-2021	
<b>Paper Title</b>	Batch and Continuous study on Adsorption of Chromium (Cr(VI)) on Carbon Nanotubes impregnated with Fe <sub>2</sub> O <sub>3</sub> (CNT/Fe)
<b>Journal Name</b>	Jouf University Science and Engineering Journal
<b>Link of the paper</b>	<a href="https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/about-the-journal/">https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/about-the-journal/</a>
<b>Abstract</b>	Raw and impregnated carbon nanotubes with Fe <sub>2</sub> O <sub>3</sub> nanoparticles (CNT/Fe) were made to remove hexavalent chromium (Cr(VI)) ions from water. The effects of contact time, pH, agitation speed, impregnated percent and adsorbent dose on the value of adsorption were studied in both batch and continuous systems. The adsorption of Cr(VI) increases with the increase of impregnated iron percent and decrease in pH. Redlich-Peterson and Thomas models give better data representation for batch and continuous system respectively. Maximum Cr (VI) removal capacity by impregnated CNTs was obtained to be 44.8 mg/g at pH 2. Spent CNT/Fe was regenerated and reused again for 4 adsorption cycles and the results showed CNT/Fe had a good efficiency to adsorb Cr (VI) from water.



2020-2021	
<b>Paper Title</b>	Improving the performance of a present single stage power plant to a combined cycle power plant: A case study
<b>Journal Name</b>	Jouf University Science and Engineering Journal
<b>Link of the paper</b>	<a href="https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/about-the-journal/">https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/about-the-journal/</a>
<b>Abstract</b>	<p>This study is concentrated on improving the performance of a single cycle power plant to a combined cycle power plant. A simulation of the process was used to simulate a real case located in the southern region of Saudi Arabia as a case study. The importance of modifying single cycle power plant to a combined cycle power plant comes from increasing the energy efficiency and reducing the emissions. When the efficiency increased the consumption of the fuels decreased so the emissions will decrease. The unit used for study generates 72.3 MW and its efficiency is 30.44%. DWSIM software has been used to simulate the process of the single cycle, and then it was modified to a combined cycle. All the parameters needed to run the simulation has been collected from the unit used as a case study. As a first step the single cycle has been simulated using the real operating data, and then the simulation has been modified to a combined cycle power plant. The simple cycle power plant simulation has been validated by comparing the data collected from the simulation with the data collected from the actual plant. So the power from the simulation obtained to be 69.97 MW and the efficiency 31.00%. This can confirm that the simulation is valid. After validation the single cycle has been modified to a combined cycle to include the heat recovery steam generator. After modification the power of the unit has been increased from 69.97 MW to 109.99 MW and the overall efficiency of the unit increased from 31.50% to 48.78%. The carbon dioxide emissions were decreased from 16.13 kg/s to 11.42 kg/s to produce the same amount of power.</p>



2020-2021	
<b>Paper Title</b>	Performance evaluation of <i>Solanum incanum</i> leaves as a biodegradable adsorbent for oil-spill cleanup in seawater
<b>Journal Name</b>	Desalination and Water Treatment Journal
<b>Link of the paper</b>	<a href="https://www.deswater.com/DWT_abstracts/vol_233/233_2021_182.pdf">https://www.deswater.com/DWT_abstracts/vol_233/233_2021_182.pdf</a>
<b>Abstract</b>	Leaves of <i>Solanum incanum</i> were used as oil adsorbent biomass in oil sorption from seawater. The capability of biomass to eliminate oil from seawater was related to its surface structure. The parameters of spilled oil ratio, sorption time, biomass dose, and the temperature of the oil/seawater system were studied. Maximum oil sorption capacity (11.54 g/g) was obtained at 4min and room temperature (28°C). The best fitting of Redlich-Peterson and Langmuir isotherm corroborates the homogeneous monolayer oil sorption process onto sorption sites of biomass rather than heterogeneous multilayer oil sorption. Pseudo-first-order kinetic model ( $R^2$ : 0.97941 and $\chi^2$ : 0.27082) provided good fitting compared to pseudo-second order ( $R^2$ : 0.95173 and $\chi^2$ : 0.63476) and Intraparticle Diffusion models ( $R^2$ : 0.76666 and $\chi^2$ : 3.06843), indicating the physical nature of oil sorption onto biomass. Moreover, the reusability results demonstrate acceptable sorption effectiveness of <i>Solanum</i> leaves up to three sorption cycles.



2020-2021	
<b>Paper Title</b>	Colloidal Fe <sub>3</sub> O <sub>4</sub> nanoparticles-based oil blend ferro-nanofluid for heat transfer application
<b>Journal Name</b>	The European Physical Journal Plus
<b>Link of the paper</b>	<a href="https://epjplus.epj.org/articles/epjplus/abs/2021/07/13360_2021_Article_1711/13360_2021_Article_1711.html">https://epjplus.epj.org/articles/epjplus/abs/2021/07/13360_2021_Article_1711/13360_2021_Article_1711.html</a>
<b>Abstract</b>	<p>The thermal conductivity enhancement of oil blend-based ferro-nanofluids for heat transfer application is rarely reported. Herein, highly stable ferro-nanofluids were prepared by dispersing oleic acid coated Fe<sub>3</sub>O<sub>4</sub> NPs into the blend of sunflower oil and mineral oil at varying volume ratios. The maximum thermal conductivity enhancement of ~91% was obtained for M10 (base fluid) oil blend-based ferro-nanofluid at 0.6 vol% of Fe<sub>3</sub>O<sub>4</sub> NPs as compared to the pure mineral oil. The dispersed NPs into the oil blend-based ferro-nanofluid executed Brownian motion which led to the collisions between the NPs as well as with the molecules of the oil blend. The formation of a chain like network by small-sized NPs effectively led to a larger volume fraction of NPs, which caused the enhancement of the thermal conductivity of oil blend-based ferro-nanofluids. Moreover, a nano-adsorption layer of oil blend was formed on the surfaces of NPs, which served as a bridge for the heat exchange between NPs and oil blend. The experimental results were validated against a similar pre-existing thermal conductivity enhancement model. Hence, this study provides a more efficient method to prepare oil-based ferro-nanofluids with a tunable thermal conductivity for heat transfer applications..</p>

2020-2021	
<b>Paper Title</b>	Active adsorption performance of planetary ball milled Saudi Arabian bentonite clay for the removal of copper ions from aqueous solution
<b>Journal Name</b>	EPL (Europhysics Letters)
<b>Link of the paper</b>	<a href="https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta">https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta</a>
<b>Abstract</b>	<p>We report the role of local bentonite clay in the removal of <math>\text{Cu}^{2+}</math> ions from aqueous solution. The fine bentonite clay powder was analysed by XRD, FTIR, SEM and DLS analysis techniques. Further, the adsorption experiments were carried out by varying many factors such as weight and size of bentonite clay, residence time, <math>\text{pH}</math> of the solution, stirring rate, temperature, and flow rate. The optimum conditions for effective removal of <math>\text{Cu}^{2+}</math> ions was 1 g dose of bentonite and 63 <math>\mu\text{m}</math> size of bentonite, 50 minutes of residence time and 50 <math>^{\circ}\text{C}</math> temperature at <math>\text{pH}</math> 3 with a flow rate of 1 L/min. The data fitted well the Freundlich model and a maximum adsorption capacity of 61.72 mg/g has been obtained. The value of Gibbs free energy changes (<math>\Delta G^{\circ}</math>), enthalpy changes (<math>\Delta H^{\circ}</math>) and entropy changes (<math>\Delta S^{\circ}</math>) were found to be <math>-3819.86 \text{ J mol}^{-1}\text{K}^{-1}</math>, <math>+15079.10 \text{ J mol}^{-1}\text{K}^{-1}</math> and <math>+58.60 \text{ J mol}^{-1}\text{K}^{-1}</math>, respectively.</p>



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**Research gate link**

<https://www.researchgate.net/profile/Omer-Bakather>

**Scopus link**

Nil



Faculty Name: Dr. Mohamed Ibrahim Osman Hassan

2019-2020	
Paper Title	<b>Uranium (VI) ions uptake from liquid wastes by Solanum incanum leaves: Biosorption, desorption and recovery</b>
Journal Name	<u>Alexandria Engineering Journal</u>
Link of the paper	<a href="https://www.sciencedirect.com/science/article/pii/S1110016820301125?via%3Dihub">https://www.sciencedirect.com/science/article/pii/S1110016820301125?via%3Dihub</a>
Abstract	<u>Solanum incanum leaves, new and valuable biomass were utilized as sorbent material for the removal of U (IV) ions from aqueous wastes. The leaves of solanum incanum were analyzed by SEM, XRD, EDS and FTIR analyses. Solanum incanum leaves have a good ability to (VI) uptake. The maximum biosorption capacity of SNL was 39.98 mg/g at pH 4 and 45 °C. 99.95% of U (VI) ions were biosorbed within 60 min in an endothermic (<math>\Delta H: 167.267 \text{ KJ mol}^{-1}</math>) batch system. The linear and nonlinear results of biosorption isotherms and kinetics indicate that Langmuir and second pseudo order models were in agreement with the experimental results. Also, the regeneration and reusing of biomass give acceptable results up to 8 cycles of the biosorption-desorption system.</u>

2020-2021	
Paper Title	<b>IMPROVING THE PERFORMANCE OF A PRESENT SINGLE STAGE POWER PLANT TO A COMBINED CYCLE POWER PLANT: A CASE STUDY</b>
Journal Name	<u>Jouf University Science and Engineering Journal</u>
Link of the paper	<a href="https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/home/">https://www.ju.edu.sa/en/jouf-university-science-and-engineering-journal-jusej/home/</a>
Abstract	This study is concentrated on improving the performance of a single cycle power plant to a combined



cycle power plant. A simulation of the process was used to simulate a real case located in the southern region of Saudi Arabia as a case study. The importance of modifying single cycle power plant to a combined cycle power plant comes from increasing the energy efficiency and reducing the emissions. When the efficiency increased the consumption of the fuels decreased so the emissions will decrease. The unit used for study generates 72.3 MW and its efficiency is 30.44%. DWSIM software has been used to simulate the process of the single cycle, and then it was modified to a combined cycle. All the parameters needed to run the simulation has been collected from the unit used as a case study. As a first step the single cycle has been simulated using the real operating data, and then the simulation has been modified to a combined cycle power plant. The simple cycle power plant simulation has been validated by comparing the data collected from the simulation with the data collected from the actual plant. So the power from the simulation obtained to be 69.97 MW and the efficiency 31.00%. This can confirm that the simulation is valid. After validation the single cycle has been modified to a combined cycle to include the heat recovery steam generator. After modification the power of the unit has been increased from 69.97 MW to 109.99 MW and the overall efficiency of the unit increased from 31.50% to 48.78%. The carbon dioxide emissions were decreased from 16.13 kg/s to 11.42 kg/s to produce the same amount of power.



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2020-2021	
Paper Title	<b>Active adsorption performance of planetary ball milled Saudi Arabian bentonite clay for the removal of copper ions from aqueous solution</b>
Journal Name	<u>Euophysys Letters (EPL)</u>
Link of the paper	<a href="https://iopscience.iop.org/article/10.1209/0295-5075/ac1960">https://iopscience.iop.org/article/10.1209/0295-5075/ac1960</a>
Abstract	We report the role of local bentonite clay in the removal of $\text{Cu}^{2+}$ ions from aqueous solution. The fine bentonite clay powder was analysed by XRD, FTIR, SEM and DLS analysis techniques. Further, the adsorption experiments were carried out by varying many factors such as weight and size of bentonite clay, residence time, $\text{pH}$ of the solution, stirring rate, temperature, and flow rate. The optimum conditions for effective removal of $\text{Cu}^{2+}$ ions was 1 g dose of bentonite and 63 $\mu\text{m}$ size of bentonite, 50 minutes of residence time and 50 $^{\circ}\text{C}$ temperature at $\text{pH}$ 3 with a flow rate of 1 L/min. The data fitted well the Freundlich model and a maximum adsorption capacity of 61.72 mg/g has been obtained. The value of Gibbs free energy changes ( $\Delta G^{\circ}$ ), enthalpy changes ( $\Delta H^{\circ}$ ) and entropy changes ( $\Delta S^{\circ}$ ) were found to be $-3819.86 \text{ J mol}^{-1} \text{K}^{-1}$ , $+15079.10 \text{ J mol}^{-1} \text{K}^{-1}$ and $+58.60 \text{ J mol}^{-1} \text{K}^{-1}$ , respectively.



Google Scholar

[https://scholar.google.com/citations?hl=en&user=P16aEMIAAAAJ&view\\_op=list\\_works&gmla=AJsN-F6jMyTpDTaWyD5AWTkId1TRf3sTDINGQpd0cUtyk9-66yRwI-V28oMdpUrx43Rm6GTq1F9T8fXsnHW9ReRZ\\_D-ZutOqVGIpBOi6-spP7zsk26hKh\\_w](https://scholar.google.com/citations?hl=en&user=P16aEMIAAAAJ&view_op=list_works&gmla=AJsN-F6jMyTpDTaWyD5AWTkId1TRf3sTDINGQpd0cUtyk9-66yRwI-V28oMdpUrx43Rm6GTq1F9T8fXsnHW9ReRZ_D-ZutOqVGIpBOi6-spP7zsk26hKh_w)

Research gate

<https://www.researchgate.net/profile/Mohamed-Hassan-219>

Scopus

<https://www.scopus.com/home.uri>



Faculty Name: Ayman Yousef

2019-2020	
<b>Paper Title</b>	Synthesis and characterization of WC@ GNFs as an efficient supercapacitor electrode material in acidic medium
<b>Journal Name</b>	Ceramics International
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S0272884220322471?dgcid=rss_sd_all">https://www.sciencedirect.com/science/article/pii/S0272884220322471?dgcid=rss_sd_all</a>
<b>Abstract</b>	<p>A two-step route to the preparation of graphene (G) nanoflakes (NFs), designed with tungsten carbide (WC) nanoparticles (WC@GNFs), through microwave irradiation and hydrothermal treatments. A uniform distribution of the WC nanoparticles on the graphene layers was confirmed through scanning electron microscopy (SEM) and transmission electron microscopy (TEM) analyses. Additionally, X-ray diffraction (XRD) study demonstrated the presence of the characteristic crystal planes of tungsten carbide on those of graphene. An increase in the graphitization degree (<math>G/1D = 4.9</math>) of the WC@GNF nanocomposite was determined by Raman spectroscopy. These highlighted physical properties enabled the application of this nanomaterial, as a supercapacitor electrode in an <math>H_2SO_4</math> electrolyte. The cyclic voltammetry (CV) scans indicated that the charging process was controlled by a pseudocapacitive contribution in conjunction with the electrical double-layered features. A specific capacitance, 1009.52 F/g, was estimated, at 1 mV/s, with improved retention of 106% during repeated cycles, at 20 A/g for 2000 cycles to outperform the obtained results for most relevant W-based nanomaterials. Therefore, the method of</p>



	fabricating WC, proposed in this work, could be a simple method of examining the performance of a series of comparable transition metal carbides toward the technology of supercapacitors technology.
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2019-2020	
<b>Paper Title</b>	Novel Low Temperature Route to Produce CdS/ZnO Composite Nanofibers as Effective Photocatalysts
<b>Journal Name</b>	Catalysts
<b>Link of the paper</b>	<a href="https://www.mdpi.com/2073-4344/10/4/417/htm">https://www.mdpi.com/2073-4344/10/4/417/htm</a>
<b>Abstract</b>	In this work, CdS/ZnO composite nanofibers (NFs) were prepared by the electrospinning of a sol–gel comprised of poly(caprolactone), zinc acetate dihydrate, cadmium acetate dihydrate, and ammonium sulfide. The electrospun NF mats were calcined under vacuum in an argon (Ar) atmosphere at 200 °C for 1 h. Standard physiochemical analysis techniques demonstrated the formation of the crystalline hexagonal phase of CdS and ZnO. Composite NFs showed good photocatalytic degradation of methylene blue (MB) dye under visible light irradiation compared to their counterparts. CdS nanoparticles, ZnO nanofibers, and composite NFs photodegraded 35.5%, 47.3%, and 90% of the MB dye, respectively, within 100 min. The reaction kinetics of MB photodegradation using the composite NFs followed the pseudo-first-order relation. Owing to their facile preparation and good photodegradation ability, the proposed method can be used to prepare various photocatalysts for wastewater treatment.



2019-2020	
<b>Paper Title</b>	Electrospun carbon nanofiber-encapsulated NiS nanoparticles as an efficient catalyst for hydrogen production from hydrolysis of sodium borohydride
<b>Journal Name</b>	International Journal of Hydrogen Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0360319919324528">https://www.sciencedirect.com/science/article/abs/pii/S0360319919324528</a>
<b>Abstract</b>	Carbon nanofibers (CNFs) incorporating NiS nanoparticles (NPs), namely NiS@CNFs were prepared by one-step electrospinning and successfully employed as a catalyst for hydrogen production from hydrolytic dehydrogenation of sodium borohydride (SBH). As-prepared NiS@CNFs, composed of polyacrylonitrile (PAN), nickel acetate, and ammonium sulfide, was calcined at 900 °C in argon atmosphere, and characterized using standard surface science techniques. The combined results revealed the growth of NiS NPs inside the CNFs, hence confirmed the presence of elemental Ni, S, and C. The as-prepared NiS@CNFs catalyst has a significantly higher surface area (650.92 m <sup>2</sup> /g) than the reported value of 376 m <sup>2</sup> /g. Importantly, this catalyst exhibited a much higher catalytic performance, for H <sub>2</sub> production from SBH, than that of Ni@CNFs, as evidenced by its low activation energy (~25.11576 kJ/mol) and their $R_{max}$ values of 2962 vs. 1770 mL/g·min. Recyclability tests on using NiS@CNFs catalyst showed quantitatively production (~100% conversion) of H <sub>2</sub> from SBH and retained up to 70% of its initial catalytic activity after five successive cycles. The low cost and high catalytic performance of the designed NiS@CNFs catalyst enable facile H <sub>2</sub> production from readily available hydrogen storage materials.



2019-2020	
<b>Paper Title</b>	A Comprehensive Review Covering Conventional and Structured Catalysis for Methanol to Propylene Conversion.
<b>Journal Name</b>	Catalysis Letter
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s10562-019-02914-4">https://link.springer.com/article/10.1007/s10562-019-02914-4</a>
<b>Abstract</b>	<p>The conversion of methanol to propylene is a value-added process and has gained extreme significance because of high demand for propylene in the production of petrochemicals. The demand for propylene is increasing due to increasing usage of polypropylene. During the last two decades, propylene demand growth has far overtaken ethylene demand growth and it is predicted to be more than double in the next 20 years. The Dalian Institute of Chemical Physics has been working for the last three decades in the R&amp;D of the methanol to olefins reaction and have developed MTP technology. The catalytic materials used in methanol to propylene conversion include SAPO-34 (small-pore molecular sieves), ZSM-5 (medium-pore zeolites) and its modified forms. Limited research has also been done using large pore zeolites such as mordenite and beta. High-silica EU-1 zeolite has been found as an efficient catalyst for MTP conversion. The use of SAPO-18, ZSM-23 and CON-type zeolite for MTP reaction has also been discussed. Methanol to propylene research has been carried using structured catalysts including ceramic based honeycomb or monolith and silicon carbide foam. The major difference in process design between SAPO-34 and H-ZSM-5 is that the SAPO-34 is used in fluidized bed process while H-ZSM-5 catalyst is used in fixed bed process. SAPO-34 is a selective catalyst for olefins but deactivates fast and thus requires</p>



frequent regeneration. The H-ZSM-5 is less selective for olefins but shows less deactivation and thus quite stable. A number of structured supports such as monolith, foam, and mesh have been researched for coating with the active zeolite based catalysts. The structured catalysts have the advantage to reduce the diffusional limitations of pellet catalyst system and have exhibited excellent results in terms of activity and selectivity for olefins as well as in reducing aromatics formation. The results obtained in our research using zeolite coated structured catalysts have shown significant increase in propylene selectivity. The significant findings of our work has been published and patented with US Patent and Trademark Office (USPTO).

2020-2021	
<b>Paper Title</b>	Fabrication of electrospun nickel sulphide nanoparticles onto carbon nanofibers for efficient urea electro-oxidation in alkaline medium
<b>Journal Name</b>	International Journal of Hydrogen Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0360319921002871">https://www.sciencedirect.com/science/article/abs/pii/S0360319921002871</a>
<b>Abstract</b>	<p>To design and synthesize a noble-metal free electrocatalyst with increased efficiency and stability during urea electro-oxidation in alkaline solution is still an important challenge in the electrocatalytic field. In this work, carbon nanofibers were decorated with nickel sulphide nanoparticles [NiS@CNFs] through the <a href="#">electrospinning technique</a> with subsequent heating into an <a href="#">argon atmosphere</a> at 900 °C for 2 h. This formed <a href="#">nanomaterial</a> was extensively characterized through X-ray diffraction (XRD), field-emission scanning electron microscopy (FE-SEM), <a href="#">transmission electron microscopy</a> (TEM), energy dispersive X-ray analysis (EDX), Raman spectroscopy and N<sub>2</sub> adsorption-desorption measurements. A conductive network of intertwined CNFs was clearly detected by FE-SEM analysis technique with varied diameters in the range of 0.6–1 µm. A highly porous nature could be suggested after incorporating NiS nanospecies resulting in increased specific surface area and valuable <a href="#">electrocatalytic activity</a> for urea molecules electro-oxidation. The <a href="#">pore size distribution</a> curves showed a decreased average pore diameter for NiS@CNFs nanocomposite by 2.53 folds when compared to that at CNFs.</p>



	<p>The electroactivity of NiS@CNFs nanomaterial for catalyzing urea electro-oxidation was investigated using cyclic voltammetry, <a href="#">chronoamperometry</a> and electrochemical <a href="#">impedance spectroscopy</a> measurements. Increased activity of this nanocatalyst was registered when urea molecules were added in increased concentrations into KOH solution. Lowered resistance values were also obtained describing the charge transfer process to confirm the feasibility of the studied reaction at NiS@CNFs surface. Moreover, its drawn chronoamperogram showed a stable performance during operation for long periods revealing a lowered catalytic decay. Accordingly, the aforementioned results of our fabricated nanomaterial could provide a good guide for fabricating suitable electrocatalysts for various electrocatalytic purposes.</p>
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2020-2021	
<b>Paper Title</b>	One-pot preparation of CdO/ZnO core/shell nanofibers: An efficient photocatalyst
<b>Journal Name</b>	Alexandria Engineering Journal
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S111001682030613X">https://www.sciencedirect.com/science/article/pii/S111001682030613X</a>
<b>Abstract</b>	<p>Herein, CdO/ZnO core/shell nanofibers (NFs) were fabricated by one-pot electrospinning technique form a solution composed of poly(vinyl alcohol), zinc acetate dihydrate, and cadmium acetate dihydrate. CdO/ZnO core/shell NFs exhibits an excellent photo-degradation of methylene blue (MB) under sunlight irradiation compared to pristine ZnO NFs. As 98.4% and 42.4% of MB dye was de-colored during 210 min using</p>



	CdO/ZnO core/shell NFs and pristine ZnO NFs, respectively. The photo-degradation reaction of MB with CdO/ZnO core/shell NFs followed the pseudo-first-order relation.
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2020-2021	
<b>Paper Title</b>	Tungsten carbide@ graphene nanoflakes: Preparation, characterization and electrochemical activity for capacitive deionization technology
<b>Journal Name</b>	Journal of Colloid and Interface Science
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0021979720308341">https://www.sciencedirect.com/science/article/abs/pii/S0021979720308341</a>
<b>Abstract</b>	In this present work, tungsten carbide (WC) nanoparticles were intercalated between graphene nanoflakes (GNFs) using sonication followed by hydrothermal treatment. Pristine WC, GNFs and a series of WC@GNFs nanomaterials were physically characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), Brunauer–Emmett–Teller (BET) and water contact angle measurements. Cyclic voltammetry and electrochemical impedance studies were operated to investigate the electrochemical performance of these nanocomposites as efficient capacitive deionization (CDI) electrodes with improved electrochemical characteristics and specific capacitances in NaCl solution. Among the synthesized nanomaterials, WC@GNFs containing 10% WC displayed appreciable specific capacitance [580.00 F g <sup>-1</sup> ], salt



	removal efficiency [95.50%], electrosorptive capacity [22.155 mg g <sup>-1</sup> ] and charge efficiency [0.356] values. Accordingly, the measured results in this study indicate that WC@GNFs nanomaterials are suitable electrodes with an easy preparation route for efficient CDI technology.
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2020-2021	
<b>Paper Title</b>	Graphitic nanofibers supported NiMn bimetallic nanoalloys as catalysts for H <sub>2</sub> generation from ammonia borane
<b>Journal Name</b>	International Journal of Hydrogen Energy
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0360319921032511">https://www.sciencedirect.com/science/article/abs/pii/S0360319921032511</a>
<b>Abstract</b>	Bimetallic nickel manganese nanoalloy-decorated graphitic <u>nanofibers</u> were prepared using electrospinning. The introduced catalysts were explored as an effective and inexpensive catalyst for H <sub>2</sub> generation from <u>ammonia borane</u> using hydrolysis. Standard techniques were used to determine the morphology and chemical composition of the nanofibers. Characterization indicated successful formation of bimetallic nickel-manganese-decorated graphitic nanofibers. Introduced effective catalysts showed a high <u>reusability</u> for H <sub>2</sub> generation using ammonia



	<p>borane hydrolysis at low concentrations and temperatures. All formations of the introduced catalysts demonstrated a higher <u>catalytic activity</u> in <math>H_2</math> generation than nickel-decorated <u>carbon nanofibers</u>. Samples composed of 55 wt% nickel and 45 wt% manganese showed the best catalytic activity compared with other formulations. Initial <u>turnover frequency</u> (TOF) of this sample was <math>58.2 \text{ min}^{-1}</math>, twice the TOF of the manganese-free catalyst. Kinetics and thermodynamics revealed that the catalyst concentration followed the pseudo-first order reaction while the ammonia borane concentration follow the pseudo-zero order reaction, providing <u>activation energy</u> of <math>38.9 \text{ kJ mol}^{-1}</math>.</p>
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2020-2021	
<b>Paper Title</b>	Fabrication of thermal insulation geopolymer bricks using ferrosilicon slag and alumina waste
<b>Journal Name</b>	Case Studies in Construction Materials
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S2214509521002527">https://www.sciencedirect.com/science/article/pii/S2214509521002527</a>
<b>Abstract</b>	The present study introduces the preparation of <u>thermal insulation geopolymer</u> bricks using <u>ferrosilicon</u> slag and <u>alumina</u> waste. <u>Compressive strength</u> , bulk density, cold and boiling water absorption, <u>apparent porosity</u> , <u>thermal conductivity</u> , and Fourier-transform

infrared spectroscopy were used to characterized the geopolymer bricks. Ferrosilicon slag suffers from low alumina content. Thus, alumina is added to compensate for this deficiency. Pristine ferrosilicon slag and the  $\text{SiO}_2/\text{Al}_2\text{O}_3$  (Si/Al, ratio = 2) sample were prepared at different NaOH concentrations (i.e., 6, 8, 10, and 12 M;  $\text{Na}_2\text{SiO}_3/\text{NaOH}$  ratio = 2.5), different curing times (i.e., 3, 7, 14, and 28 days), and room temperature. The 8 M NaOH concentration achieved the best compressive strength. Accordingly, different Si/Al ratios were prepared and tested at 8 M NaOH, room temperature, and different curing times (i.e., 3, 7, 14, and 28 days). Results indicate that increasing the alumina content enhances the geopolymer properties but reduces the compressive strength of the prepared geopolymer. The sample with Si/Al ratio = 1 exhibited a higher compressive strength (10.9 MPa) than the other Si/Al ratios (i.e., 4, 3, 2, and 0.5) and the pristine ferrosilicon slag after 28 days of curing and at 8 M NaOH. The obtained value is consistent with the ASTM C62 and Egyptian standards. Furthermore, the addition of alumina waste decreased the thermal conductivity of the prepared geopolymer bricks.



2020-2021	
<b>Paper Title</b>	Insights on the role of supporting electrospun carbon nanofibers with binary metallic carbides for enhancing their capacitive deionization performance
<b>Journal Name</b>	Journal of Materials Research and Technology
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S2238785421011170">https://www.sciencedirect.com/science/article/pii/S2238785421011170</a>
<b>Abstract</b>	Recent development in desalination technology can be progressed in terms of fabricated <u>nanomaterials</u> and operating parameters, as one among energy-storing systems including fuel cells, capacitors, batteries, and so on. Regarding the examined nanomaterials, embedded $\text{CoCr}_7\text{C}_3$ nanoparticles onto carbon nanofibers ( $\text{CoCr}_7\text{C}_3@\text{CNFs}$ ) were prepared using a facile electrospinning technique. Characterization techniques, such as XRD, FESEM, TEM, <u>HRTEM</u> , STEM, and EDX, were served to define the crystallinity, morphology and



chemical composition of the synthesized nanofibers. XRD chart demonstrated the formation of  $\text{Cr}_7\text{C}_3$  species along with deposited metallic cobalt in this nanomaterial. The morphological study revealed the uniform distribution of metallic cobalt and  $\text{Cr}_7\text{C}_3$  nanoparticles onto the fibrous CNFs structure. The electrochemical performance of  $\text{CoCr}_7\text{C}_3@\text{CNFs}$  was studied in 1.0 M NaCl solution at  $5 \text{ mV s}^{-1}$  to record a specific capacitance of  $250 \text{ F g}^{-1}$ . Electrochemical impedance spectroscopy measurements indicated better electron transfer properties after introducing  $\text{CoCr}_7\text{C}_3$  to the CNFs structure. Furthermore, its outstanding electrosorption capacity of  $20.40 \text{ mg g}^{-1}$  might encourage the preparation of additional nanocomposites for future capacitive deionization (CDI) technology.

Google Scholar link

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Research gate link

<https://www.researchgate.net/profile/Ayman-Yousef-12>



Scopus link

<https://www.scopus.com/feedback/author-affiliation/review.uri?afwFlowId=1619111582242>

Faculty Name: Saleh Mohamed Matar

2019-2020	
<b>Paper Title</b>	Induction of Plant Resistance against Tobacco Mosaic Virus Using the Biocontrol Agent Streptomyces cellulosae Isolate Actino 48
<b>Journal Name</b>	Agronomy
<b>Link of the paper</b>	<a href="https://www.mdpi.com/2073-4395/10/11/1620">https://www.mdpi.com/2073-4395/10/11/1620</a>



<b>Abstract</b>	<p>Viral plant diseases represent a serious problem in agricultural production, causing large shortages in the production of food crops. Eco-friendly approaches are used in controlling viral plant infections, such as biocontrol agents. In the current study, <i>Streptomyces cellulosa</i> isolate Actino 48 is tested as a biocontrol agent for the management of tobacco mosaic virus (TMV) and inducing tomato plant systemic resistance under greenhouse conditions. Foliar application of a cell pellet suspension of Actino 48 (<math>2 \times 10^7</math> cfu. mL<sup>-1</sup>) is performed at 48 h before inoculation with TMV. Peroxidase activity, chitinase activity, protein content, and the total phenolic compounds are measured in tomato leaves at 21 dpi. On the other hand, the TMV accumulation level and the transcriptional changes of five tomato defense-related genes (PAL, PR-1, CHS, PR-3, and PR-2) are studied. Treatment with Actino 48 before TMV inoculation (48 h) induced tomato plants to increase their levels of peroxidase and chitinase enzymes. Furthermore, a significant increase in the concentration of total phenolic compounds was observed in Actino 48 and TMV-treated tomato plants compared to TMV-treated tomato plants alone. Treatment with Actino 48 reduced the TMV accumulation level (53.8%) compared to treatment with the virus alone. Actino 48 induced plant growth, where the fresh and dry weights of tomato plants increased. Additionally, significant increases of the PAL, PR-1, CHS, and PR-3 transcripts were observed. On the other hand, a higher induction of PR-2 was only observed in TMV-treated tomato plants. In conclusion, <i>S. cellulosa</i> isolate Actino 48 can be used as a biocontrol agent for the reduction of symptoms and severity of TMV.</p>
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2019-2020	
<b>Paper Title</b>	Maximization of siderophores production from 3 biocontrol agents, <i>Pseudomonas aeruginosa</i> F2 and 4 <i>Pseudomonas fluorescens</i> JY3 using batch and 5 exponential fed-batch fermentation,
<b>Journal Name</b>	Processes, 8(4), 455
<b>Link of the paper</b>	<a href="https://www.mdpi.com/2227-9717/8/4/455">https://www.mdpi.com/2227-9717/8/4/455</a>



<b>Abstract</b>	<p>Twenty fluorescent <i>Pseudomonas</i> isolates were tested for their ability to produce siderophores on chrome azurol S (CAS) agar plates and their antagonistic activity against six plant pathogenic fungal isolates was assessed. Scaling-up production of siderophores from the promising isolates, <i>P. aeruginosa</i> F2 and <i>P. fluorescens</i> JY3 was performed using batch and exponential fed-batch fermentation. Finally, culture broth of the investigated bacterial isolates was used for the preparation of two economical bioformulations for controlling <i>Fusarium oxysporum</i> and <i>Rhizoctonia solani</i>. The results showed that both isolates yielded high siderophore production and they were more effective in inhibiting the mycelial growth of the tested fungi compared to the other bacterial isolates. Exponential fed-batch fermentation gave higher siderophore concentrations (estimated in 10 <math>\mu</math>L), which reached 67.05% at 46 h and 45.59% at 48 h for isolates F2 and JY3, respectively, than batch fermentation. Formulated <i>P. aeruginosa</i> F2 and <i>P. fluorescens</i> JY3 decreased the damping-off percentage caused by <i>F. oxysporum</i> with the same percentage (80%), while, the reduction in damping-off percentage caused by <i>R. solani</i> reached 87.49% and 62.5% for F2 and JY3, respectively. Furthermore, both formulations increased the fresh and dry weight of shoots and roots of wheat plants. In conclusion, bio-friendly formulations of siderophore-producing fluorescent <i>Pseudomonas</i> isolates can be used as biocontrol agents for controlling some plant fungal diseases.</p>
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2019-2020	
<b>Paper Title</b>	Fermentation, formulation and evaluation of PGPR <i>Bacillus subtilis</i> isolate as a bioagent for reducing occurrence of peanut soil-borne diseases
<b>Journal Name</b>	Journal of Integrative Agriculture , 18(9): 2080–2092
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/pii/S2095311919625785">https://www.sciencedirect.com/science/article/pii/S2095311919625785</a>
<b>Abstract</b>	Four isolates of <i>Bacillus subtilis</i> coded, B4, B7, B8 and B10 were examined as biocontrol agents for their abilities and antagonistic effect on the <i>in vitro</i> growth of certain phytopathogenic fungi of peanut, <i>Rhizoctonia</i>



*solani* and *Sclerotium rolfsii*. *Bacillus subtilis* isolate B4 (GenBank accession no. EF150884) was the highly effective one for inhibiting the fungal mycelial growth. Batch fermentation of *B. subtilis* isolate B4 was carried out and the maximum biomass achieved was  $4.53 \text{ g L}^{-1}$  at 11 h. *Bacillus subtilis* isolate B4 was formulated and evaluated as a biofungicide to reduce peanut soil-borne diseases under greenhouse and field conditions at the side of Rizolex-T (fungicide) as standard. Treatments by formulated plant growth-promoting rhizobacteria (PGPR) *B. subtilis* B4 and Rizolex-T in a soil infested with *R. solani*, *S. rolfsii* and mixture of them were more effective in decreasing percentage of damping-off, root and pod rot disease incidence (%) in greenhouse and open field environment during the two seasons 2015 and 2016. Treatments by PGPR gave highly dry weight and number of healthy pods compared to control of fungi treatment which was nearby to dry weights of healthy pods achieved by treatments by Rizolex-T in a soil infested with *S. rolfsii*, *R. solani* and mixture of them. Formulated PGPR *B. subtilis* B4 gave higher increasing of yield percentage than treatment by Rizolex-T in the two evaluated seasons 2015 and 2016. It can conclude that the produced bioformulated agent was more efficient as fungicide when compared with the other chemical synthesized fungicides, safe for human and the environment and economy.

2020-2021

**Paper Title**

Licorice, doum, and banana peel extracts inhibit *Aspergillus flavus* growth and suppress metabolic pathway of Aflatoxin B1 production



<b>Journal Name</b>	Agronomy. MDPI_Publisher, 11(8) :1587; 2021
<b>Link of the paper</b>	<a href="https://doi.org/10.3390/agronomy11081587">https://doi.org/10.3390/agronomy11081587</a>
<b>Abstract</b>	Three different concentrations of four (ethanol, acetone, methanol, and diethyl ether) extracts of licorice, doum, and banana peel were evaluated for antifungal and antimycotoxigenic efficiency against a maize aflatoxigenic fungus, <i>Aspergillus flavus</i> . Among them, the licorice diethyl ether 75% extract was intensely active, showing the best wet and dry weight inhibition and exhibiting the highest efficacy ratio (91%). Regarding aflatoxin B1 (AFB1) production, all the plant extracts tested were effective against AFB1 production after one month of maize storage, with average efficacy ratios ranging from 74.1% to 97.5%. At the same time, Thiram fungicide exhibited an efficacy ratio of 20.14%. The relative expression levels of three structural genes ( <i>afID</i> , <i>afIP</i> , and <i>afIQ</i> ) and two regulatory genes ( <i>afIR</i> and <i>afIS</i> ) were significantly downregulated when compared to untreated maize grains or Thiram-treated maize grains. The doum diethyl ether 75% peel extract showed the highest total phenolic content (60.48 mg GAE/g dry extract wt.) and antioxidant activity (84.71 µg/mL). GC–MS analysis revealed that dimethoxycinnamic acid, aspartic acid, valproic acid, and linoleic acid might imbue the extracts with antioxidant capacities in relation to fungal growth and aflatoxin biosynthesis. Finally, the results suggest that the three plant extracts can be considered a promising source for developing potentially effective and environmentally safer alternative ways to control aflatoxin formation, thus creating a potentially protective method for grain storage.

2020-2021	
<b>Paper Title</b>	Reducing the incidence of onion downy mildew disease using bio-formulation of pseudomonas fluorescens, limonene and acetyl salicylic acid
<b>Journal Name</b>	Plant Cell Biotechnology and Molecular Biology 22(1&2):103-120; 2021
<b>Link of the paper</b>	<a href="https://www.ikprress.org/index.php/PCBMB/article/view/5839">https://www.ikprress.org/index.php/PCBMB/article/view/5839</a>
<b>Abstract</b>	Formulated Pseudomonas fluorescens isolate JY8, limonene (L) and acetyl salicylic acid (ASA) were evaluated

	<p>individually or in combinations for their ability to decrease onion downy mildew disease severity under greenhouse and open field conditions. The foliar applications of formulated <i>P. fluorescens</i> JY8, limonene and acetyl salicylic acid were used at the rate of 0.25%, 0.5% and 4 mM, respectively. On the other hand, the recommended fungicide, Acrobat MZ 69% WP was utilized at the rate of 0.25%. In addition, two genes-encoding enzymes, chalcone synthase and chalcone isomerase (CHS and CHI), in flavonoids biosynthesis pathway in <i>Allium cepa</i> were detected at the functional and transcriptional level (mRNA level) in onion tissues under different treatments. The obtained results showed that the foliar spray with recommended fungicide was the most effective treatment to decrease onion downy mildew disease severity under greenhouse and open field conditions followed by combination of limonene and acetyl salicylic acid (L+ASA), and limonene (L) alone. All treatments containing <i>P. fluorescens</i> JY8 gave highly yield of onion bulbs except treatment with combination (JY8+L+ASA), which was the least effective treatment. Electrophoretic pattern of PCR products for detection of CHS and CHI encoding-genes demonstrated an induction of CHS gene expression at a main transcriptional band of <math>\approx 420</math> bp but detection of CHI gene expression was observed at main two transcriptional bands of <math>\approx 340</math> and 970 bp. The higher expression of CHS gene was found in treatment of ASA but in case of CHI gene the higher expression was found in treatments of JY8, ASA, JY8+ASA and L+ASA in comparison with other treatments and untreated control. In conclusion, treatments with JY8 and ASA induced encoded polyphenol synthetic genes in onion tissues and these genes might play an important role in defense reaction towards infection of downy mildew disease. But treatment with limonene (L) reduced disease severity of onion downy mildew through its effect as antifungal material.</p>
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2020-2021	
<b>Paper Title</b>	Application of Bio-Friendly Formulations of Chitinase-Producing <i>Streptomyces cellulosa</i> Actino 48 for Controlling Peanut Soil-Borne Diseases Caused by <i>Sclerotium rolfsii</i>
<b>Journal Name</b>	J. Fungi 2021, 7, 167



<b>Link of the paper</b>	<a href="https://doi.org/10.3390/jof7030167">https://doi.org/10.3390/jof7030167</a>
<b>Abstract</b>	<p>Of ten actinobacterial isolates, <i>Streptomyces cellulosa</i> Actino 48 exhibited the strongest suppression of <i>Sclerotium rolfsii</i> mycelium growth and the highest chitinase enzyme production (<math>49.2 \text{ U L}^{-1} \text{ min}^{-1}</math>). The interaction between Actino 48 and <i>S. rolfsii</i> was studied by scanning electron microscope (SEM), which revealed many abnormalities, malformations, and injuries of the hypha, with large loss of <i>S. rolfsii</i> mycelia density and mass. Three talc-based formulations with culture broth, cell-free supernatant, and cell pellet suspension of chitinase-producing Actino 48 were characterized using SEM, Fourier transform infrared spectroscopy (FTIR), and a particle size analyzer. All formulations were evaluated as biocontrol agents for reducing damping-off, root rot, and pods rot diseases of peanut caused by <i>S. rolfsii</i> under greenhouse and open-field conditions. The talc-based culture broth formulation was the most effective soil treatment, which decreased the percentage of peanut diseases under greenhouse and open-field conditions during two successive seasons. The culture broth formulation showed the highest increase in the dry weight of peanut shoots, root systems, and yielded pods. The transcriptional levels of three defense-related genes (<i>PR-1</i>, <i>PR-3</i>, and <i>POD</i>) were elevated in the culture broth formulation treatment compared with other formulations. Subsequently, the bio-friendly talc-based culture broth formulation of chitinase-producing Actino 48 could potentially be used as a biocontrol agent for controlling peanut soil-borne diseases caused by <i>S. rolfsii</i>.</p>

**Google Scholar link**

<https://scholar.google.com/citations?user=27hFus4AAAAJ&hl=en>

**Research gate link**

<https://www.researchgate.net/profile/Saleh-Matar-2>



**Scopus link**

<https://www.scopus.com/search/form.uri?zone=TopNavBar&origin=searchbasic&display=basic#basic>



Faculty Name: Mehraj ud din Naik

2021-2022	
<b>Paper Title</b>	<b>Simple and facile preparation of tunable chitosan tubular nanocomposite microspheres for fast uranium (VI) removal from seawater</b>
<b>Journal Name</b>	<b>Chemical Engineering Journal</b>
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.cej.2021.130934">https://doi.org/10.1016/j.cej.2021.130934</a>
<b>Abstract</b>	<p>The seawater contains 4.5 billion tons of uranium(VI), which is quite enough to provide a continuous supply of infinite nuclear energy. However, it is a sudden need to develop adsorbents from abundant available source, easy collect property, large durability and high uranium(VI) adsorption capacity from seawater. In this work, a single-step process was developed for the preparation of chitosan (Cs) functionalized tubular carbon nanocomposite microspheres (CsFTnCM) for efficient uranium(VI) adsorption from seawater. The application of newly synthesized adsorbent for uranium(VI) removal from seawater is explored. Thus prepared adsorbent (CsFTnCM2) is found to adsorb 99.5% uranium(VI) from seawater. The CsFTnCM2 (Cs/FTn,1:1) comprising <math>\text{NH}_2</math> and <math>\text{COOH}</math> content approximately 0.61 mmol/g and 0.23 mmol/g, respectively. This kind of adsorbent possessed a uranium(VI) loading capacity of 0.660 (mg/g) from seawater. The adsorption kinetics not only dependent on the physical structure of the adsorbent but depends on the proportion of FTn in the Cs-matrix. However, the kinetics of uranium(VI) adsorption was increased by increasing the content of FTn up to a certain limit. The adsorption efficiency of uranium(VI) was not affected by the presence of coexisted ions, whose concentration is 1000 times greater than uranium(VI) in seawater. The desorption of uranium(VI) from the seawater exposed adsorbents were investigated and the results showed the uranium(VI) strip from the adsorbents found to be efficiently using <math>\text{Na}_2\text{CO}_3</math>.</p>



2020-2021	
<b>Paper Title</b>	<b>Modeling the Effects of the Contaminated Environments on COVID-19 Transmission in India</b>
<b>Journal Name</b>	<b>Results in Physics</b>
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.rinp.2021.104774">https://doi.org/10.1016/j.rinp.2021.104774</a>
<b>Abstract</b>	<p>COVID-19 is an infectious disease caused by the SARS-CoV-2 virus that caused an outbreak of typical pneumonia first in Wuhan and then globally. Although researchers focus on the human-to-human transmission of this virus but not much research is done on the dynamics of the virus in the environment and the role humans play by releasing the virus into the environment. In this paper, a novel nonlinear mathematical model of the COVID-19 epidemic is proposed and analyzed under the effects of the environmental virus on the transmission patterns. The model consists of seven population <u>compartments</u> with the inclusion of contaminated environments means there is a chance to get infected by the virus in the environment. We also calculated the threshold quantity to know the disease status and provide conditions that guarantee the local and global asymptotic stability of the equilibria using Volterra-type Lyapunov functions, LaSalle's invariance principle, and the Routh–Hurwitz criterion. Furthermore, the sensitivity analysis is performed for the proposed model that determines the relative importance of the disease transmission parameters. Numerical experiments are performed to illustrate the effectiveness of the obtained theoretical results.</p>

2020-2021	
<b>Paper Title</b>	<b>Global dynamics and bifurcation analysis of a fractional-order SEIR epidemic model with saturation incidence rate</b>
<b>Journal Name</b>	<b>Mathematical Methods in the Applied Sciences</b>
<b>Link of the paper</b>	<a href="https://doi.org/10.22541/au.162530373.38917682/v1">https://doi.org/10.22541/au.162530373.38917682/v1</a>
<b>Abstract</b>	<p>The present paper studies a fractional-order SEIR epidemic model for the transmission dynamics of infectious diseases such as HIV and HBV that spreads in the host population. The total host population is considered bounded, and Holling type-II saturation incidence rate is involved as the infection term. Using the proposed SEIR epidemic model, the threshold quantity, namely basic reproduction number <math>R_0</math>, is obtained that determines the status of the disease, whether it dies out or persists in the whole population. The model's analysis shows that two equilibria exist, namely, disease-free equilibrium (DFE) and endemic equilibrium (EE). The global stability of the equilibria is determined using a Lyapunov functional approach. The disease status can be verified based on obtained threshold quantity <math>R_0</math>. If <math>R_0 &lt; 1</math>, then DFE is globally stable, leading to eradicating the population's disease. If <math>R_0 &gt; 1</math>, a unique EE exists, and that is globally stable under certain conditions in the feasible region. The Caputo type fractional derivative is taken as the fractional operator. The bifurcation and sensitivity analyses are also performed for the proposed model that determines the relative importance of the parameters into disease transmission. The numerical solution of the model is obtained by the generalized Adams-Bashforth-Moulton method. Finally, numerical simulations are performed to illustrate and verify the analytical results.</p>



2020-2021	
<b>Paper Title</b>	<b>Preparation of amidoxime modified porous organic polymer flowers for selective uranium recovery from seawater</b>
<b>Journal Name</b>	<b>Chemical Engineering Journal</b>
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.cej.2021.129370">https://doi.org/10.1016/j.cej.2021.129370</a>
<b>Abstract</b>	Simple and facile technologies for efficient uranium(VI) removal from seawater is highly interesting for energy and environmental sustainability. By take advantage of the polymerization of acrylonitrile, amidoxime modified porous organic polymer flower-like structure (POP-AOF) adsorbent is synthesized. POP-AOF is of great interest for energy and environmental applications, since their unique structures not only provides high functionality but also accelerates high selectivity via secondary building units. The unique structure of POP-AOF showed multistep kinetics controlled by chemisorption and intraparticle diffusion model. In practical applications, POP-AOF performed as an efficient adsorbent for selective uranium(VI) removal from simulated solution and seawater are investigated. Time-dependent measurement of uranium(VI) adsorption capacity and half-saturation time of seawater exposed POP-AOF is analyzed using a one-site ligand saturation model. The coordination was analyzed by spectroscopic analysis and amidoxime groups of POP-AOF act as a bidentate ligand to trap uranium(VI) from seawater. This work addresses the potential of acrylonitrile and amidoxime chemistry for the development of new adsorbents for efficient uranium(VI) removal from seawater.



2020-2021	
<b>Paper Title</b>	<b>Differential gradient evolution plus algorithm for constraint optimization problems: A hybrid approach</b>
<b>Journal Name</b>	<b>An International journal of Optimization and Control : Theories &amp; Applications (IJOCTA)</b>
<b>Link of the paper</b>	<a href="https://doi.org/10.11121/ijocta.01.2021.001077">https://doi.org/10.11121/ijocta.01.2021.001077</a>
<b>Abstract</b>	Optimization for all disciplines is very important and applicable. Optimization has played a key role in practical engineering problems. A novel hybrid meta-heuristic optimization algorithm that is based on Differential Evolution (DE), Gradient Evolution (GE) and Jumping Technique named Differential Gradient Evolution Plus (DGE+) are presented in this paper. The proposed algorithm hybridizes the above-mentioned algorithms with the help of an improvised dynamic probability distribution, additionally provides a new shake off method to avoid premature convergence towards local minima. To evaluate the efficiency, robustness, and reliability of DGE+ it has been applied on seven benchmark constraint problems, the results of comparison revealed that the proposed algorithm can provide very compact, competitive and promising performance.



2020-2021	
<b>Paper Title</b>	<b>Modeling the transmission dynamics of COVID-19 pandemic in caputo type fractional derivative</b>
<b>Journal Name</b>	<b>Journal of Multiscale Modelling</b>
<b>Link of the paper</b>	<a href="https://doi.org/10.1142/S1756973721500062">https://doi.org/10.1142/S1756973721500062</a>
<b>Abstract</b>	<p>COVID-19 disease, a deadly pandemic ravaging virtually throughout the world today, is undoubtedly a great calamity to human existence. There exists no complete curative medicine or successful vaccines that could be used for the complete control of this deadly pandemic at the moment. Consequently, the study of the trends of this pandemic is critical and of great importance for disease control and risk management. Computation of the basic reproduction number by means of mathematical modeling can be helpful in estimating the potential and severity of an outbreak and providing insightful information which is useful to identify disease intensity and necessary interventions. Considering the enormity of the challenge and the burdens which the spread of this COVID-19 disease placed on healthcare system, the present paper attempts to study the pattern and the trend of spread of this disease and prescribes a mathematical model which governs COVID-19 pandemic using Caputo type derivative. Local stability of the equilibria is also discussed in the paper. Some numerical simulations are given to illustrate the analytical results. The obtained results shows that applied numerical technique is computationally strong for modeling COVID-19 pandemic.</p>



2020-2021	
<b>Paper Title</b>	<b>Stability analysis of a fractional-order cancer model with chaotic dynamics</b>
<b>Journal Name</b>	<b>International Journal of Biomathematics</b>
<b>Link of the paper</b>	<a href="https://doi.org/10.1142/S1793524521500467">https://doi.org/10.1142/S1793524521500467</a>
<b>Abstract</b>	In this paper, we develop a three-dimensional fractional-order cancer model. The proposed model involves the interaction among tumor cells, healthy tissue cells and activated effector cells. The detailed analysis of the equilibrium points is studied. Also, the existence and uniqueness of the solution are investigated. The fractional derivative is considered in the Caputo sense. Numerical simulations are performed to illustrate the effectiveness of the obtained theoretical results. The outcome of the study reveals that the order of the fractional derivative has a significant effect on the dynamic process. Further, the calculated Lyapunov exponents give the existence of chaotic behavior of the proposed model. Also, it is observed from the obtained results that decrease in fractional-order $\rho$ increases the chaotic behavior of the model.



Google Scholar link

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Research gate link

<https://www.researchgate.net/profile/Mehraj-Ud-Din-Naik>

Scopus link

<https://www.scopus.com/authid/detail.uri?authorId=16480840700>



Faculty Name: Mohammad Ashraf Ali

2019-2020 (5 PAPERS)	
<b>Paper Title</b>	Selective Production of Propylene from Methanol over Monolith Supported Modified ZSM- 5 Catalysts
<b>Journal Name</b>	Energy & Fuels, 33 (2), 1458-1466, 2019
<b>Link of the paper</b>	<a href="https://pubs.acs.org/doi/10.1021/acs.energyfuels.8b04020">https://pubs.acs.org/doi/10.1021/acs.energyfuels.8b04020</a>
<b>Abstract</b>	<p>The catalytic activity of ZSM-5 zeolites with a SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> molar ratio of 30, 50, 80, 280, and 410 was investigated in a fixed bed continuous flow reactor system and was found that the ZSM-5 zeolite with SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> molar ratio of 280 (HZ-280) exhibited best catalyst performance. The optimized reaction conditions achieved were 500 °C, 1 bar pressure, and weight hourly space velocity of 15 h<sup>-1</sup> using methanol as feed. At optimum reaction conditions, HZ-280 exhibited propylene selectivity of 47.3% and propylene yield 17.4% with 100% methanol conversion. HZ-280 zeolite was modified with P, Ce, Fe, and La to select the best promoter to enhance propylene selectivity and yield. The best-modified catalyst obtained was HZ-280 with 0.1 wt % phosphorus loading, which further improved propylene selectivity by 14% and yield by 24.7%. Then, the monolith structured catalysts were prepared by single-layer (6.8%), double-layer (10.3%), and triple-layer (13.1%) coating of HZ-280 catalyst. HZ-280 single-layer-coated monolith-structured catalyst effectively increased propylene selectivity by 19.2% and yield by 34.5% with no liquid hydrocarbons in the product. HZ-280-coated monolith catalyst was regenerated and was reused for three cycles. Negligible activity loss was observed for methanol conversion and propylene selectivity. This reflects that the structured catalyst is viable and economical for commercial applications. Analytical techniques such as X-ray diffraction, scanning electron microscopy–energy-dispersive X-ray, Brunauer–Emmett–Teller, and NH<sub>3</sub>-temperature-programmed desorption</p>



	were used for characterization of the catalysts
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2019-2020	
<b>Paper Title</b>	A Comprehensive Review Covering Conventional and Structured Catalysis for Methanol to Propylene Conversion
<b>Journal Name</b>	Catalysis Letter, 149, 3395–3424, 2019
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s10562-019-02914-4">https://link.springer.com/article/10.1007/s10562-019-02914-4</a>
<b>Abstract</b>	<p>The conversion of methanol to propylene is a value-added process and has gained extreme significance because of high demand for propylene in the production of petrochemicals. The demand for propylene is increasing due to increasing usage of polypropylene. During the last two decades, propylene demand growth has far overtaken ethylene demand growth and it is predicted to be more than double in the next 20 years. The Dalian Institute of Chemical Physics has been working for the last three decades in the R&amp;D of the methanol to olefins reaction and have developed MTP technology. The catalytic materials used in methanol to propylene conversion include SAPO-34 (small-pore molecular sieves), ZSM-5 (medium-pore zeolites) and its modified forms. Limited research has also been done using large pore zeolites such as mordenite and beta. High-silica EU-1 zeolite has been found as an efficient catalyst for MTP conversion. The use of SAPO-18, ZSM-23 and CON-type zeolite for MTP reaction has also been discussed. Methanol to propylene research has been carried using structured catalysts including ceramic based honeycomb or monolith and silicon carbide foam. The major difference in process design between SAPO-34 and H-ZSM-5 is that the SAPO-34 is used in fluidized bed process while H-ZSM-5 catalyst is used in fixed bed process. SAPO-34 is a selective catalyst for olefins but deactivates fast and thus requires frequent regeneration. The H-ZSM-5 is less selective for olefins but shows less deactivation and thus quite stable. A</p>



	number of structured supports such as monolith, foam, and mesh have been researched for coating with the active zeolite based catalysts. The structured catalysts have the advantage to reduce the difusional limitations of pellet catalyst system and have exhibited excellent results in terms of activity and selectivity for olefns as well as in reducing aromatics formation. The results obtained in our research using zeolite coated structured catalysts have shown signifcant increase in propylene selectivity. The signifcant fndings of our work has been published and patented with US Patent and Trademark Ofce (USPTO).
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2019-2020	
<b>Paper Title</b>	Liquid Phase Selective Hydrogenation of Phenol to Cyclohexanone over Electrospun Pd/PVDF-HFP Catalyst
<b>Journal Name</b>	Fibers, 7(4), 28, 2019
<b>Link of the paper</b>	<a href="https://www.mdpi.com/2079-6439/7/4/28">https://www.mdpi.com/2079-6439/7/4/28</a>
<b>Abstract</b>	Cyclohexanone is an important industrial intermediate in the synthesis of materials such as nylons, but preparing it efficiently through one-step hydrogenation of phenol is hindered by over-reduction to cyclohexanol. Using an efficient catalyst can enhance the selectivity of cyclohexanone at high phenol conversion. In this study, catalysts comprised of palladium nanoparticles supported on electrospun PVDF-HFP (polyvinylidene fluoride-co-hexafluoropropylene) nanofibers were prepared using the electrospinning technique. The catalysts were characterized using thermogravimetric analyzer (TGA), scanning electron microscopy (SEM), transmission electron microscope (TEM), and drop shape analyzer (DSA). The prepared catalysts were used to hydrogenate phenol into cyclohexanone in a batch reactor. The Pd/PVDF-HFP catalyst showed a very high product selectivity and high phenol conversion. The conversion of phenol achieved was 98% with 97% cyclohexanone selectivity in 7 h using 15 wt% of palladium (0.0021 moles) relative to phenol (0.0159 moles). The turnover number (TON) and



turnover frequency (TOF) values calculated were 7.38 and 1.05 h<sup>-1</sup>, respectively. This paper presents original research in heterogeneous catalysis using novel electrospun nanofibers. Multiphase hydrogenation of phenol to cyclohexanone over electrospun Pd/PVDF-HFP catalyst has not been reported by any researcher in the literature. This work will also provide a research window for the application of electrospun polymeric nanofibers in multiphase reactions.

2019-2020	
<b>Paper Title</b>	UV light enabled photocatalytic activity of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> nanoparticles synthesized via phase transformation.
<b>Journal Name</b>	Materials Letters, 258, 1-4, 2020
<b>Link of the paper</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0167577X19313795">https://www.sciencedirect.com/science/article/abs/pii/S0167577X19313795</a>
<b>Abstract</b>	In this work, hematite ( $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> ) nanoparticles (NPs) were synthesized by co-precipitation method involving chemical precipitation of aqueous salts of iron (Fe <sup>2+</sup> /Fe <sup>3+</sup> ) using NaOH aqueous solution. The synthesis of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> NPs via phase transformation and its photocatalytic application under ultra violet (UV) light is rarely reported. The maximum removal of methylene blue (MB) dye (92%) was achieved at pH 10 and 200 mg amount of catalyst, whereas the concentration of dye was 10 ppm. The removal percentage of MB dye was found to vary with pH of the solution, concentrations of dye, and amount of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> NPs for certain interval of time. Moreover,



	plot of $\ln(C_t/C_0)$ Vs time exhibited almost a linear relationship between them which suggested the pseudo-first order kinetics reaction of photocatalytic degradation of MB.
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2019-2020	
<b>Paper Title</b>	Designing a Photo Catalytic Reaction System for Degradation of Organic dyes in Wastewater Using Nanostructured Materials
<b>Journal Name</b>	Int. J. Nano. Chem., 6(1), 21-25, 2020
<b>Link of the paper</b>	<a href="http://www.naturalspublishing.com/files/published/63k5se841ulq33.pdf">http://www.naturalspublishing.com/files/published/63k5se841ulq33.pdf</a>
<b>Abstract</b>	In this study, degradation of methylene blue (MB) from water was investigated by photocatalysis process in the presence of nanoTiO <sub>2</sub> and nanoTiO <sub>2</sub> /AC under solar irradiation process. The parameters studied were amount of catalyst, initial concentration of the organic dye MB and the pH of the MB solution to achieve the best parameters for efficient degradation process. The results showed that pH of solution changed towards basic was found to enhance the photocatalytic efficiency. The amount of the catalyst was found to be 6 mg as optimal. The 10 ppm of MB concentration leads to achieve highest degradation efficiency of MB.

2020-2021 (PAPER)	
<b>Paper Title</b>	A comprehensive and updated review of studies on the oxidation of cyclohexane to produce KA oil.
<b>Journal Name</b>	Reviews in Chemical Engineering
<b>Link of the paper</b>	<a href="https://doi.org/10.1515/revce-2020-0059">https://doi.org/10.1515/revce-2020-0059</a>



<b>Abstract</b>	<p>Oxidation of cyclohexane is an essential chemical reaction for the industrial manufacture of cyclohexanol and cyclohexanone. These two compounds, together known as ketone–alcohol (KA) oil, are the main feedstock for nylon 6 and nylon 6,6 productions. Several types of catalysts and reaction conditions have been used for cyclohexane oxidation. This paper presents a thorough literature review of catalytic materials used for cyclohexane oxidation to produce KA oil using oxygen, air and other oxidizing agents as well as utilizing different solvents. This review covers research and development reported over the years 2014– 2020. This review aims to comprehend the type of catalysts, solvents, oxidants and other reaction parameters used for the oxidation of cyclohexane. Three types of cyclohexane oxidation processes namely thermocatalytic, photocatalytic and microwave-assisted catalytic have been reported. The results of the review showed that metal and metal oxide loaded silica catalysts performed excellently and provided high selectivity of KA oil and cyclohexane conversion. The use of peroxides is not feasible due to their high price compared to air and oxygen. Gold nanoparticles supported on silica performed with high selectivity and good conversion. The use of hydrochloric acid as an additive was found very effective to enhance the photocatalytic oxidation of cyclohexane. Water on the catalyst surface enhanced the reactivity of the photocatalysts since it helps in the generation of hydroxyl radicals.</p>
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2020-2021 (PAPER)	
<b>Paper Title</b>	An updated comprehensive literature review on phenol hydrogenation
<b>Journal Name</b>	Catalysis Letters
<b>Link of the paper</b>	<a href="https://doi.org/10.1007/s10562-021-03714-5">https://doi.org/10.1007/s10562-021-03714-5</a>
<b>Abstract</b>	<p>Cyclohexanone is an important industrial intermediate to produce nylons. The main industrial routes for cyclohexanone manufacture used cyclohexane and phenol as feedstock. The selective hydrogenation of phenol to cyclohexanone comprises one-step and two-step processes. This review presents a detailed analysis of the</p>



	research findings available in the open literature for phenol hydrogenation to produce cyclohexanone and cyclohexanol and covers the research conducted during 2014–2020 using conventional and modern catalysts. This review aims to disseminate the knowledge of the current research conducted for phenol hydrogenation and provide a comprehensive resource for researchers working in this field. This review has included and discussed both methods of thermocatalytic and electrocatalytic hydrogenation of phenol. Most of the studies have used carbon or carbon–nitrogen supported catalysts loaded with Pd. The carbon and carbon–nitrogen materials were derived from different sources including polymers, activated carbon, and MOF. Oxygen treatment was found to produce highly active and stable catalysts. The high performance was found associated with the high surface area of the catalyst and uniformly dispersed metal nanoparticles. The acidic conditions exhibited an increase in catalyst performance. Alkali-promoted precious metal-loaded catalysts performed better than un-promoted catalysts.
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2020-2021 (PAPER)	
<b>Paper Title</b>	Highly photocatalytic active r-GO/Fe <sub>3</sub> O <sub>4</sub> nanocomposites development for enhanced photocatalysis application: A facile low-cost preparation and characterization
<b>Journal Name</b>	Ceramics International
<b>Link of the paper</b>	<a href="https://doi.org/10.1016/j.ceramint.2021.08.083">https://doi.org/10.1016/j.ceramint.2021.08.083</a>
<b>Abstract</b>	This research explores reduced graphene oxide-Fe <sub>3</sub> O <sub>4</sub> nanocomposites synthesis, characterization, and its ability to degrade methylene blue dye using sodium lamp as the visible white light source. The modified co-precipitation method was employed for the synthesis of the <u>photocatalyst</u> . The photocatalyst was further characterized by various characterization techniques. Moreover, photocatalytic activity was performed by varying performance conditions, and analyzed the results. It was found that photocatalyst has highly active performance at the working conditions of pH 12 with 50 mg catalyst for 10 ppm methylene blue dye solutions and produced 98.3%



	degradation of the dye within 80 min. It was also observed that minor positive performance was observed on varying temperature and catalyst concentration. The photocatalytic activity was found highly dependent on the pH of the solution and increased with an increase in pH. Additional studies were also performed by adding some amount of hydrogen peroxide in the solution without changing its pH. It was also noted that as the amount of hydrogen peroxide was increased in the solution, there was an increment in the degradation of the dye. A maximum of 98.8% degradation was recorded with the 9 ml addition of hydrogen peroxide-containing 25 mg catalyst, pH 8, and at 40 °C reaction temperature within 70 min of irradiation.
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2020-2021 (Conference)	
<b>Paper Title</b>	Synthesis of Ag nanoparticles loaded on nanoTiO <sub>2</sub> catalyst using mechanical ball milling for phenol photodegradation
<b>Journal Name</b>	Proceedings of the 9 <sup>th</sup> Jordan International Chemical Engineering Conference (JICHEC9), 12-14 Oct. 2021
<b>Link of the paper</b>	<a href="http://www.jeaconf.org/JICHEC">http://www.jeaconf.org/JICHEC</a>
<b>Abstract</b>	The nanoTiO <sub>2</sub> loaded with Ag nanoparticles (Ag/nanoTiO <sub>2</sub> ) was prepared by the mechanical ball milling method and used for the photocatalytic degradation of phenol in an aqueous solution. The Ag/nanoTiO <sub>2</sub> catalyst was characterized by X-Ray Diffraction (XRD) and UV-Visible spectrophotometer. The bandgap analysis for the Ag/nanoTiO <sub>2</sub> catalyst was performed by the Tauc plot method and was found to be 2.6 eV. The presence of Ag and nanoTiO <sub>2</sub> were identified by their peaks in the XRD spectrum. The photodecomposition of phenol was carried out using pure nanoTiO <sub>2</sub> and Ag/nanoTiO <sub>2</sub> under sunlight, ultraviolet light, and visible white light using different



amounts of catalyst and phenol concentration. The visible white light provided highest phenol degradation among the three irradiation sources. The loading of Ag on nanoTiO<sub>2</sub> improved the phenol degradation rate and offered higher phenol degradation as compared to nanoTiO<sub>2</sub>. A maximum of 94% degradation was recorded in 120 minutes for 10 mg of Ag/nanoTiO<sub>2</sub> catalyst and 10 ppm concentration of phenol at pH 8 under the visible white light source. The phenol photodegradation reaction with Ag/nanoTiO<sub>2</sub> catalyst was found to follow zero-order kinetics.

#### Google Scholar link

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#### Research gate link

<https://publons.com/researcher/1549657/m-a-ali/publications/>

#### Scopus link

<https://www.scopus.com/authid/detail.uri?authorId=55262680900>

Faculty Name: Dr. Salah Eldeen Fadoll Hegazi

2020-2021	
<b>Paper Title</b>	Active adsorption performance of planetary ball milled Saudi Arabian bentonite clay for the removal of copper ions from aqueous solution
<b>Journal Name</b>	<u>Europhysics letters EPL</u>
<b>Link of the paper</b>	<a href="https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta">https://iopscience.iop.org/article/10.1209/0295-5075/ac1960/meta</a>
<b>Abstract</b>	<p>We report the role of local bentonite clay in the removal of <math>\text{Cu}^{2+}</math> ions from aqueous solution. The fine bentonite clay powder was analysed by XRD, FTIR, SEM and DLS analysis techniques. Further, the adsorption experiments were carried out by varying many factors such as weight and size of bentonite clay, residence time, <math>pH</math> of the solution, stirring rate, temperature, and flow rate. The optimum conditions for effective removal of <math>\text{Cu}^{2+}</math> ions was 1 g dose of bentonite and 63 <math>\mu\text{m}</math> size of bentonite, 50 minutes of residence time and 50 <math>^{\circ}\text{C}</math> temperature at <math>pH</math> 3 with a flow rate of 1 L/min. The data fitted well the Freundlich model and a maximum adsorption capacity of 61.72 mg/g has been obtained. The value of Gibbs free energy changes (<math>\Delta G^{\circ}</math>), enthalpy changes (<math>\Delta H^{\circ}</math>) and entropy changes (<math>\Delta S^{\circ}</math>) were found to be <math>-3819.86 \text{ J mol}^{-1}\text{K}^{-1}</math>, <math>+15079.10 \text{ J mol}^{-1}\text{K}^{-1}</math> and <math>+58.60 \text{ J mol}^{-1}\text{K}^{-1}</math>, respectively.</p>



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Research gate

<https://www.researchgate.net/profile/Salah-Hegazi>

Scopus

<https://id.elsevier.com/settings/updateAddress>



Faculty Name: Mohammed Farji

2020-2021	
<b>Paper Title</b>	Development of Photovoltaic Cells: A Materials Prospect and Next-Generation Futuristic Overview
<b>Journal Name</b>	Brazilian Journal of Physics
<b>Link of the paper</b>	<a href="https://link.springer.com/article/10.1007/s13538-021-00981-w">https://link.springer.com/article/10.1007/s13538-021-00981-w</a>
<b>Abstract</b>	<p>Photovoltaic (PV) solar cells are in high demand as they are environmental friendly, sustainable, and renewable sources of energy. The PV solar cells have great potential to dominate the energy sector. Therefore, a continuous development is required to improve their efficiency. Since the whole PV solar panel works at a maximum efficiency in a solar panel called maximum power point (MPP) and characterized by I–V analysis, an MPP technique has been developed to exploit the PV modules' maximum power in all possible conditions. Various methods of fabrication for PV solar cells have been discussed in this review. The performances of these PV cells have also been compared and summarized in a table. Moreover, in this review, the development of different generations of PV solar cells and their respective characteristics for future applications have been discussed. Furthermore, the MPP method and its suitability for an artificial neural network (ANN)–based approach to detect the global maximum power point have also been discussed in this review. Finally, the conclusion and future perspective of PV solar cells have been presented.</p>



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