

# **1st Conference on Science and Technology for Early Career Researchers and Postgraduate Students (STEPS 2020)**

IOP Conference Series: Materials Science and Engineering  
Volume 1058

Erbil, Iraq  
20-22 December 2020

## **Editors:**

**Dhiya Al-Jumeily  
Rafid Al Khaddar  
Talib Al-Khaseraji  
Sabeeh Lafta Farhan  
Mohammed Al-Jumaili  
Abir Hussain  
Laith Abdul-Rahaim  
Jasim Salman  
Khalaf Gaeid  
Anas Al-Hayawi  
Abbas Al-Hdabi**

**Khalid Hashim  
Monower Sadique  
Ptryk Kot  
Salah Zubaidi  
Michaela Gkantou  
Magomed Muradov  
Alaa Abd Ali  
Shatha Al-Samarrai  
Saleem Ethaib Mohammad  
Jareer Jaber Mohammed**

ISBN: 978-1-7138-4572-0  
ISSN: 1757-8981

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

This work is licensed under a Creative Commons Attribution 3.0 International Licence.  
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact the Institute of Physics  
at the address below.

Institute of Physics  
Dirac House, Temple Back  
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481  
Fax: 44 1 17 920 0979

[techtracking@iop.org](mailto:techtracking@iop.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

Preface	
Peer review declaration	
Plant-based coagulants for water treatment.....	1
<i>Ghusoon J. Shabaa, Wael S. H. Al-Jboory, Hala M. Sabre, Abdulaziz Alazmi, Mohanad M. Kareem, Ahmed AlKhayyat</i>	
Improving the performance of crushed limestone concrete utilizing supplementary cementitious materials: A case study in Iraq .....	10
<i>Adnan A. Muhsin, Nabeel Hameed Al-Saati, Suad Mohammed Heil, Khalid Hashim, Ahmed H. AlKhayyat</i>	
Mitigation of wastewater biological pollution using the electrocoagulation method .....	23
<i>Zinah K. K. Dosh, Ammar K. A. Maslookhi, Alyaa N. Al-Saidi, Basel Alenezi, Joseph Amoako-Attah</i>	
Experimental Investigations of Partial Replacement of OPC with PFA and GGBS in cement mortar .....	32
<i>Abdullah Bin Quraya, Abbas Al-Ameeri, Raad Hashim, David Yeboah, Ali Shubbar, Anas Y. Al-Hayawi, Dhiya Al-Jumeily, Jamila Mustafina</i>	
Removal of phenols and COD from petroleum refinery wastewater using electrocoagulation method.....	40
<i>Hussam Abbas, Saba S. M. Al-Obaidy, Shatha Y. Al-Samarray, Khaled Edwan, Anas Y. Al-Hayawi, David Yeboah</i>	
Reusing of furnace bottom ash as an adsorbent for phosphate removal from water .....	51
<i>Isra'a S. Samaka, Abduljaleel Al-Janabi, M Abdulredha, Abdullah Alkandari, Mawada Abdellatif, David Yeboah</i>	
Using SF and CKD as cement replacement materials for producing cement mortar .....	62
<i>M Abdulredha, Adnan A. Muhsin, Abduljaleel Al-Janabi, Bader N. Alajmi, M. Gkantou, Joseph Amoako-Attah, Dhiya Al-Jumeily, Jamila Mustafina, Ahmed AlKhayyat</i>	
Assessment of the effects of municipal landfills on the metal pollution in the surrounding soils: A case study in Iraq.....	71
<i>Jawad K. A. Al-Rifaie, Suad M. Heil, Saheb K. Khamees, Saad Alajmi, David Yeboah, Mawada Abdellatif, Ahmed AlKayyat</i>	
Zeolite as a natural adsorbent for nitrogenous compounds removal from water .....	79
<i>M Abdulredha, N R Kadhim, Ameer H Hussein, Mohammad Almutairi, Rafid Alkhaddar, David Yeboah, K Hashim, Ahmed AlKhayyat</i>	
Numerical study of concrete-filled aluminium alloy tubular columns under eccentric compression.....	88
<i>Shafayat Bin Ali, George S. Kamaris, Michaela Gkantou, Kunal Kansara, Khalid Hashim</i>	
Aluminium alloy cross-sections under uniaxial bending and compression: A numerical study.....	98
<i>Evangelia Georgantzia, Michaela Gkantou, George S. Kamaris, Kunal Kansara, Khalid Hashim</i>	

An experimental study for adapting electrocoagulation as a technique for fluoride removal from water.....	108
<i>Ali Naser Aayef, Wasim T. Mahdi Al Masoodi, Ruaa Jameel Kamel, M Abdulredha, Nayef A. Almansoori, Patryk Kot, Magomed Muradov</i>	
Heavy metal pollution removal from water using a cost-effective bio-adsorbent.....	118
<i>Shaymaa I. Saeed, Rasha Z. T. Ahmed, Ruqayah Ali Grmasha, Soltan M. Alenezi, Jasim M. Salman, Osamah J. Al-Sareji, Hayfaa A. Mubarak, Ahmed AlKhayyat</i>	
Analysis of Air Quality Index Distribution of PM <sub>10</sub> and PM <sub>2.5</sub> Concentrations in Ambient Air of Al-Hillah City, Iraq.....	126
<i>Ruqayah Ali Grmasha, Shahla N. A. Al-Azzawi, Osamah J. Al-Sareji, Talal Alardhi, Mawada Abdellatif, Hayfaa A. Mubarak, Ahmed Alkhayyat</i>	
Copper removal from water using carbonized sawdust.....	136
<i>Osamah J. Al-Sareji, M Abdulredha, Hayfaa A. Mubarak, Ruqayah A. Grmasha, Abdalrahman Alnowaishry, Patryk Kot, Rafid Al-Khaddar, Ahmed AlKhayyat</i>	
Dye removal from textile wastewater using solar-powered electrocoagulation reactor.....	145
<i>Sabrean Farhan Jawad, Nahlah Salman Saddam, Qasim J. Adaami, Mohanad M. Kareem, M Abdulredha, Hayfaa A. Mubarak, Patryk Kot, Michaela Gkantou, Ahmed AlKhayyat</i>	
Phosphate removal from water using low-cost dolomite filters.....	155
<i>Faris M. Hamoodi, Mohammed Ibrahim Mohammed, Reham S. Alwash, Patryk Kot</i>	
Determining the Ultrasonic Pulse Velocity (UPV) of Cement Mortar with Partial Replacement of OPC with CKD and SF.....	166
<i>Raad Hashim, Abbas Al-Ameeri, Alaa Ali Diwan, Saad Alajmi, David Yeboah, Dhiya Al-Jumeily, Jamila Mustafina, Ahmed AlKhayyat</i>	
Agro-based carbon for lead removal from solutions.....	174
<i>Salam M. Naser, Sarah A. Ali, Rasha S. Alkizwini, Mohammad Alshamali, Saif S. Alquzweeni, Mawada Abdellatif, Joseph Amoako-Attah, Ahmed AlKhayyat</i>	
Agri-food wastes for heavy metals removal from water.....	187
<i>Zainab Abbas Al Talebi, Sahar F. Abbas, Rasha S. Alkizwini, Saud Alazemi, Saif S. Alquzweeni, Patryk Kot, Magomed Muradov, Ahmed H. AlKhayyat</i>	
Denitrification of water using a low-cost adsorbent.....	199
<i>Wisam A. Jawad, Sadiq J. Baqir, Saif S. Alquzweeni, Abdalrahman Alajmi, Rasha S. Alkizwini, Patryk Kot, Ahmed H. AlKhayyat</i>	
Optimization of electrochemical removal of metal pollution from aqueous solution.....	211
<i>Rasha S. Alkizwini, Saif S. Alquzweeni, Khalida A. Thejeel, Homoud S. Aldhafiri, Patryk Kot, Michaela Gkantou, A. H. AlKhayyat</i>	
Evaluation of the Use of Lignocellulic Biomass in Thermal Insulation for Green Building.....	222
<i>Jacob Cotterill, Saleem Ethaib, Khalid Hashim, Faisal Alqashou, Anas Y. Al-Hayawi, Mawada Abdellatif, Michaela Gkantou, Ali Shubbar</i>	
Removal of bacterial pollution from municipal wastewater using electrocoagulation technique.....	232
<i>Israa L. Al-Jaryan, Rand L. Al-Jaryan, Sarab A. Jouda, Shmlan Alotaibi, Mawada Abdellatif, Ahmed AlKhayyat</i>	
Development of Equations Relates the Factors Affecting Riverbank Stability Using Dimensional Analysis.....	240
<i>Asad H. Aldefae, Rusul A. Alkhafaji</i>	

Fires Accidents and its Implication on Mechanical and Structural Properties of Different Construction Materials .....	251
<i>Asad H. Aldefae, Abbas S. Edan, Abbas F. Essa</i>	
CFD Analysis for Different Types of Fins to Enhancement the Heat Transfer Rate Through A Cross Flow Heat Exchanger .....	262
<i>Shatha Ali Merdan, Zena Khalefa Kadhim, Ali Arkan Alwan</i>	
Statistical analysis of groundwater quality parameters in selected sites at Kirkuk governorate/Iraq .....	272
<i>Ahmed Khaleel Ibrahim, Salwa Hadi Ahmed, Ahmed Yasir Radeef, Massod Muhsin Hazzaa</i>	
Ultra High Performance Concrete Preparation Technologies and Factors Affecting the Mechanical Properties: A Review.....	284
<i>Adil M. Jabbar, Mohammed J. Hamood, Dhiyaa H. Mohammed</i>	
A spatial and temporal comparison of Five Total Electron Content providers.....	296
<i>Jareer Mohammed</i>	
Effect of soil saturation conditions and helical configurations on compression capacity of screw piles .....	306
<i>Mahmood R Mahmood, Nahla M Salim, Ammar A Al-Gezzy</i>	
Concrete Erosion Modelling by Water Jet using Discrete Phase Method .....	318
<i>Rawaa H. Ismaeil, Ali N. Hilo, Thaar S. Al-Gasham, Ali Hameed Abd</i>	
Seismic performance of gravity quay wall .....	329
<i>Alaa N. Aldelfee, Asad H. Aldefae</i>	
Phenol Removal From Synthetic Wastewater by Adsorption Column.....	339
<i>Muzher M I AL-Doury, M H Alwan</i>	
Study the performance of three-phase induction motor under imbalanced non-sinusoidal supply .....	351
<i>Abdulsatar H. Jassim, Arkan A. Hussein, Laith F. Abbas</i>	
Laboratory assessment of performance of WMA containing Sasobit .....	363
<i>Hasan H Joni, Aqeel Y M Alkhafaji</i>	
Decolorization and Mycoremediation of Methyl Orange using Beauveria bassiana.....	376
<i>Haneen A. Kh. Karaghool, Khalid Hashim</i>	
Numerical modeling of seismic performance of gravity quay wall.....	384
<i>Alaa N. Aldelfee, Asad H. Aldefae, Salah L. Zubaidi</i>	
Utilization of Shape Memory Alloy (SMA) for Temperature Detection and Warning in an Automobile Engine.....	392
<i>Husam Yahya Imran, Dayang Laila Abang Abdul Majid, Saleem Ethaib, Danish Mahmood Baitab, Leong Shii Jang</i>	
Decays in strength, ductility, stiffness, and toughness of RC corbels due to fire exposure.....	400
<i>Jasim M. Mhalhal, Manal A. Alawsi, Thaar S. Al-Gasham</i>	
Soil erosion and the influenced factors: A review article .....	409
<i>Shereen Adnan, Asad H. Aldefae, Wissam H. Humaish</i>	
Digital Era Influence on Neighbourhood Planning .....	420
<i>Sabeeh Lafia Farhan, T Mutaz, Haider I Alyasari, Salah L Zubaidi, K S Hashim</i>	

Free-form geometries in contemporary architecture – dimensional rules of Folded, Blob and Formlessness architecture.....	430
<i>Anas Hameed Majeed, Huda Al-Alwan, Nazar Oukaili</i>	
The Influence of Exciting Vibrational Force on the Performance of Evacuated Tube Heat Pipe Solar Collector.....	441
<i>Sarah H. Ali, Adel A. Eidan, Assaad Al Sahlani, Ali Mohammed Hayder</i>	
Dynamic response of different bridge piers.....	452
<i>Husam K. Alaayedi, Asad H. Aldefae, Mohammed S. Shamkhi, Wissam H. Humaish</i>	
Quick Review of Seismic Behavior of Gravity Quay Wall.....	462
<i>Alaa N. Aldelfee, Asad H. Aldefae, Wissam H. Humaish</i>	
Study of Distribution Ice-Forming reagent in the Boundary layer of the atmosphere When Exposed by Ground Aerosol Generators NAG-07M .....	470
<i>Qasim S. Kadhim, Iqbal H. Abdulkareem, Nagham T. Ibraheem</i>	
An encryption based on DNA and AES algorithms for hiding a compressed text in colored Image .....	481
<i>Qusay S. Alsaffar, Hatem N. Mohaisen, Firas N. Almashhdini</i>	
The Impact of Transit on Sustainable Urban Form .....	493
<i>Ihsan Abbas Jasim, Sabeeh Lafta Farhan, Haider Majid Hasan</i>	
Removal of fluoride, nitrates and phosphor from drinking water using electrocoagulation: A Review.....	502
<i>Rusul K Abdulkhadher, Ali j Jaeel</i>	
Damage assessment of RC voided slabs experienced extreme fire flame .....	513
<i>Manal A. Alawsi, Jasim M. Mhalhal, Thaar S. Al-Gasham, Sallal R. Abid</i>	
Analysing the Transformed Urban Patterns of Al-Najaf Historical Center: Urgent Issues and Possible Solutions.....	522
<i>Sabeeh Lafta Farhan, Haider I Alyasari, Venus S Akef, Salah L Zubaidi, K S Hashim</i>	
Two-hybrid sine cosine algorithm based on Invasive weed optimization algorithm and Bat algorithm .....	532
<i>Ayad Hamad Khalaf, Ban Ahmed Mitras</i>	
Physicochemical properties of modified epoxy used for reinforcing concrete by carbon fiber reinforced polymer .....	541
<i>Alya'a A Al-Attar, Mazin B Abdulrahman, Eethar Thanon Dawood, Aziz I Abdulla, Muyasser M Juma'ah, Hashim A Rzazk</i>	
The Threshold of Urban Sustainability within the Traditional Cities: Traditional Alnajaf city as a case study .....	551
<i>Hussam S. O. Adelphi, Sabeeh Lafta Farhan, Haitham A. H. Alshamari</i>	
Review of Abrasion Mechanisms and Influential Variables on The Disintegration Resistance of Concrete .....	562
<i>Rawaa H. Ismaeil, Ali N. Hilo, Thaar S. Al-Gasham</i>	
Passive air-conditioning of domestic using a hybrid system of solar updraft tower and a geothermal in Tikrit city-Iraq.....	572
<i>Fayadh M Abed, Maki H Zaidan, Yousif H Hussein, Abdullah K Jassim</i>	

Bubble slabs burned at 800 °C with different periods .....	584
<i>Thaar S. Al-Gasham, Jasim M. Mhalhal, Lamea J. Al-Magsusy</i>	
The evaluation of the abrasion damage in hydraulic structures using the modified test method.....	593
<i>Mostafa H. Hamedi, Ali N. Hilo, Thaar S. Al-Ghasham, Nadheer S. Ayoob, Hamid Shirazi, Russul N. Al-Mousawy</i>	
Texture descriptors for better face recognition performance.....	605
<i>Muthana H. Hamd, Saba K. Naji</i>	
Seasonal characterization of municipal solid waste in the city of Jammu, India.....	615
<i>Pervez Alam, Mohd. Aamir Mazhar, Afzal Husain Khan, Nadeem A Khan, Alaa El Din Mahmoud</i>	
Theoretical and numerical study for unsteady tube expansion using hemispherical dies.....	627
<i>Hazim Khaleel Khalaf, Azal Rifaat Ismail, Yusra Abdullah Jasim</i>	
Oilfield-produced water characteristics and treatment technologies: a mini review .....	638
<i>Abdulaziz Jafar Abbas, Hatem Asal Gzar, Mahdi Nuhair Rahi</i>	
Performance of Sustainable Concrete Containing HDPE Plastic Wastes as Coarse Aggregate: Minor Review.....	648
<i>Milad M. Radhi, Wasan Ismail Khalil, Sarmad Shafeeq Abdulqader</i>	
The Role of Urban Planning and Urban Design on Safe Cities.....	654
<i>Mohammed Abdul-Kadhum Al-Ghiyadh, Saba J. Neamah Al-Khafaji</i>	
Simulating a Stochastic Signal of Urban Water Demand by a Novel Combination of Data Analytic and Machine Learning Techniques.....	665
<i>Salah L. Zubaidi, Hussein Al-Bugharbee, Yousif Raad Muhsin, Sadik Kamel Gharghan, Khalid Hashim, Hussein Mohammed Ridha, Rafid Alkhaddar, Patryk Kot, Mawada Abdellatif</i>	
Reducing peak to average power ratio (PAPR) of OFDM systems using complex BIFORE precoding transform.....	674
<i>Mohanad A. Saleh, Mounir T Hamood, Mohammed Sh Ahmed</i>	
Nutrients and organics removal from slaughterhouse wastewater using phytoremediation: A comparative study on different aquatic plant species .....	682
<i>Rahat Alam, Saif Ullah Khan, Farrukh Basheer, Izharul Haq Farooqi</i>	
Removal lead Pb (II) from wastewater using kaolin clay .....	694
<i>Shaymaa Talib Hussain, Seroor Atalah Khaleefa Ali</i>	
Urban changes and its impact on the tangible and intangible heritage of City's Centre: Najaf City as a Case Study .....	702
<i>Sabeeh Lafta Farhan, Hamed Hyab Samir, Hussam S. Adelphi</i>	
Conservation Approach as an Architectural Instrument to reviving Historical Cities; technical analysis for multi international cases.....	711
<i>Sabeeh Lafta Farhan, Haider I Alyasari, Hamed Hyab Samir, Salah L Zubaidi, K S Hashim</i>	
Treatment of petroleum refinery effluents and wastewater in Iraq: A mini review.....	721
<i>Mahdi Nuhair Rahi, Ali Jweid Jaeel, Abdulaziz Jafar Abbas</i>	
The Shear Strength Parameters as a Function of the Volumetric Water Content of Baghdad City Soils at Tigris River Bank .....	732
<i>A A Al-Obaidi, R H Irzooki, H F Al-Dulaimy</i>	

A study on effective adsorption of lead from an aqueous solution using Copper Oxide nanoparticles.....	742
<i>Rumman Zaidi, Saif Ullah Khan, Ameer Azam, Izharul Haq Farooqi</i>	
Ideality factor of Al/nanosilver/PS/Si/Al sandwich structure.....	753
<i>Hanan R. A. Ali</i>	
Modified FIA-CL system for the on-line analysis of Pb(II) in aqueous solution, following treatment with chemically modified tomato peel as a biosorbent.....	761
<i>Parween H. Saleem, Hadar M. Abdullah, Suhad A. Yasin</i>	
Azo Coupling Reaction for indirect Spectrophotometric Determination of Furosemide using Resorcinol as a Reagent.....	772
<i>Ali I. Abdullah, Sumayha M. Abass</i>	
Synthesis, Characterization and Evaluation of fungal Activity of Copper(II) and Cobalt(II) Complexes with Imine Glutaraldehyde Derivatives.....	781
<i>Aeed Alfahdawi, Iman Husam Mohammed, Dina Hameed Zaidan</i>	
Spectrophotometric Determination of Naproxen using Metol reagent by Oxidative Coupling Reaction.....	791
<i>Ghania Abed Hasan, Mohsin Hamza Bakir</i>	
Evaluation of some Food Poisoning Bacterial Inhibition from ZnO and Ag Nanoparticles that Synthesized by Aspergillus niger .....	802
<i>Khalaf N. Ahmed, Karkaz M. Thalij, Mohammed J. Mohammed</i>	
Spectrophotometric Determination of Mefenamic acid using Metol reagent by Oxidative Coupling Reaction.....	811
<i>Istabraq Qahtan Rashad, Mohsin Hamza Bakir</i>	
Optimize of emergence speed and productivity of potato (Solanum tuberosum L.) by using different cover treatments.....	821
<i>K Y Aied, J Z Ghassan, H B Abdulrahman</i>	
Application of salicylaldehyde based-metal binuclear dithiocarbamate complexes for iron and copper removal from wastewater .....	829
<i>Elaf S. Hamooda, Aeed S. Al-Fahdawi</i>	
Estimation of some active compounds in members from Cynareae tribe (Asteraceae) growing in central and northern Iraq .....	842
<i>Wijdan S. A. Hamad, Talib O. Al-Khesraji</i>	

## **Author Index**