

July-September 2021 Happenings

Events

Dr **Ming Zheng** joined Dr Gamal El-Din's group in August. Dr Zheng received his PhD from Tongji University/University of Arizona (Joint-Doctoral Program) on Environmental Science and Engineering in 2019. He was working as a postdoctoral fellow at Shanghai University before joining the University of Alberta. He will be conducting FES research in the area of advanced oxidation processes, focusing on solar-based catalytic oxidation.

Dr **M Anne Naeth**'s research lab supported a Women In Scholarship, Engineering, Science and Technology (WISEST) Summer Research Program student to work on two FES projects with PhD students **Stephanie Ibsen** and **Yihan Zhao**. Katherine Labreche, a Grade 11 student from Airdrie, virtually contributed to the projects through literature reviews and data organization while learning about reclamation, meeting with mentors and other students enthusiastic about science, and participating in LRIGS and FES events that were offered.

Dr **Aman Ullah** gave a keynote lecture on Renewable Biopolymers: A Step Towards Sustainable Circular Economy, at the Polymer Connect Conference: Polymer Science and Composite Materials held virtually 5-7 July.

Dr **Mohamed Gamal El-Din** was a keynote speaker at the 2nd International Conference for Membrane Technology and Its Applications, MTAIC 2021, in Cairo, Egypt, 15-17 August. The title of his talk was Application of Membrane Bioreactors for the Treatment of Industrial Process Water - Insights on Operating Conditions and Membrane Fouling.

Dr **Aman Ullah** and PhD student **Irum Zahara** participated in the American Chemical Society's Fall Virtual Meeting 22-26 August. Dr Ullah delivered an invited talk entitled Novel Materials from Renewable Resources for Water Remediation and co-organized a session Ecosystems, Water and Food Security in a Changing World with colleagues from the U.S. and Kuwait as part of the Division of Environmental Chemistry. Irum presented her research A Feather Keratin Derived Sorbents For The Treatment Of Waste Water Produced During Energy Generation Systems With The Effect Of Process Parameters On Adsorption.

Our theme was well represented at Energy Week 2021 with 4 oral and 3 poster presentations. The week-long event had over 1,000 attendees and much discussion was stimulated in the individual sessions. Presentations by our members are below.

- Cascadden, M, M Kingston and D Jennings. Life cycle analysis of novel constructed wetlands water reclamation materials. Oral.
- Fiestas-Flores, J, G Hauer, V Adamowicz, M Gamal El-Din, MA Naeth and P Chelme-Ayala. A dynamic economic analysis of oil sands process-affected water (OSPW) treatment alternatives in Alberta. Oral.
- Ibsen-Chute, S and MA Naeth. Composition and optimal sampling time for soil invertebrates in reclaimed coal mine sites in central Alberta. Oral.
- Lu, Q, Q Xu, J Meng, ZT How, P Chelme-Ayala, X Wang, M Gamal El-Din and X Zhang. Enhancement of photodegradation in water by surface microlenses under visible light. Poster.
- Nzediegwu, C, Y Tang, MA Naeth and SX Chang. Biochars have a greater adsorption capacity for lead(II) from aqueous solutions than hydrochars. Poster.

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- Zahara, I, M Arshad, MA Naeth, T Siddique and A Ullah. Adsorption kinetics and modeling for removal of heavy metals from wastewater by keratin derived sorbents. Oral.
- Zhao, Y and MA Naeth. Carbon based materials for remediation of cadmium and zinc contaminated water. Poster.

Dr **Christopher Nzediegwu** attended two workshops on life cycle assessment and sustainable waste management in September organized by the Asia Pacific Rim Universities and University of South Korea. The knowledge gained will contribute to his FES research on development of biochars and hydrochars for land reclamation.

Achievements

During Energy Week 2021, over six theme-based sessions, a panel of nine judges selected and recognized exceptional research communications in five minute lightning presentations. Two PhD students in our theme took home top awards in the Landscapes session, with first place going to **Maggie Cascadden** and second place to **Stephanie Ibsen**. Congratulations to them both, and to all of our HQP who participated for amazing presentations.

Dr **Mohamed Gamal El-Din** was recognized as a World Expert in Chemical Water Pollutants in the last 10 years by Expertscape. The organization objectively ranks experts with demonstrated experience based on scientific publications. The complete list of can be viewed at www.expertscape.com/ex/water+pollutants%2C+chemical.

Stephanie Ibsen received the Spirit of Dr Armour Advocate Award at the Celebration of Research wrap up session for the WISEST Summer Research Program. This award is presented to a principal investigator or supervisor, who through their participation in the summer research program, has shown advocacy in creating a more diverse STEM community.

Six peer reviewed papers were published this quarter.

Ganiyu, SO, S Sable and M Gamal El-Din. 2022. Advanced oxidation processes for the degradation of dissolved organics in produced water: a review of process performance, degradation kinetics and pathway. Chemical Engineering Journal 429:132492. DOI: [10.1016/j.cej.2021.132492](https://doi.org/10.1016/j.cej.2021.132492).

Luo, Z, L Meng, ZT How, P Chelme-Ayala, L Yang, C Benally and M Gamal El-Din. 2022. Treatment of oil sands process water by the ferric citrate under visible light irradiation. Chemical Engineering Journal 429:132419. DOI: [10.1016/j.cej.2021.132419](https://doi.org/10.1016/j.cej.2021.132419).

Song, J, ZT How, Z Huang and M Gamal El-Din. 2022. Biochar/iron oxide composite as an efficient peroxymonosulfate catalyst for the degradation of model naphthenic acids compounds. Chemical Engineering Journal 429:132220. DOI: [10.1016/j.cej.2021.132220](https://doi.org/10.1016/j.cej.2021.132220).

Arslan, M and M Gamal El-Din. 2021. Removal of per- and poly-fluoroalkyl substances (pfass) by wetlands: prospects on plants, microbes and the interplay. Science of the Total Environment 800:149570. DOI: [10.1016/j.scitotenv.2021.149570](https://doi.org/10.1016/j.scitotenv.2021.149570).

Ouyang, C, K We, X Huang, **M Gamal El-Din** and X Zhang. 2021. Bifunctional Fe for induced graphitization and catalytic ozonation based on Fe/N-doped carbon-Al₂O₃-framework: theoretical calculations guided catalyst design and optimization. Environmental Science and Technology 55:11236-11244. DOI: [10.1021/acs.est.1c00728](https://doi.org/10.1021/acs.est.1c00728). This collaborative research with



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Tsinghua University was featured as the front cover of the 17 August 2021 issue <https://pubs.acs.org/toc/esthag/55/16>.

Shaughnessy, B, **A Dhar** and **MA Naeth**. 2021. Natural recovery of vegetation on reclamation stockpiles after 26 to 34 years. *Écoscience* DOI: [10.1080/11956860.2021.1943931](https://doi.org/10.1080/11956860.2021.1943931).

Yihan Zhao's PhD research on the potential of nano humus for coal mine reclamation was featured in a FES article in Folio this summer www.ualberta.ca/folio/2021/07/coal-mining-waste-material-more-than-90-per-cent-effective-at-removing-heavy-metal.html. The article led to Mining.com publishing another on the research www.mining.com/coal-mining-byproduct-highly-effective-for-land-reclamation/. This media attention resulted in three companies contacting Dr Naeth and Yihan with interest in participating in or supporting future research to expand the use of this novel material.

Notices And Reminders

Annual Workshop

The Resilient Reclaimed Land and Water Systems theme's annual workshop will be held virtually Tuesday, December 14 2021. Save the date and more details on schedule and presentations will be provided in October.

CFREF Acknowledgement

FES has updated their acknowledgement requirements. Please use the below statement in all papers, reports and presentations.

"This research was supported by funding from the Canada First Research Excellence Fund as part of the University of Alberta's Future Energy Systems research initiative."

If required by publications, the CFREF FES Grant Identification Number is CFREF-2015-00001.

More information on acknowledging CFREF and FES including logos for presentations can be found in Forum. Select Administration / CFREF Policies and Acknowledgements from the menu on the left of page.

Travel

Virtual conference expenses such as registration fees are considered a travel expense; however, the full FES Travel Form is not required. Supporting documentation should include conference name, dates and location, hosting organization(s), relevance to your FES research and indicate if presenting. For HQP, an email indicating approval to attend from your supervisor is required.