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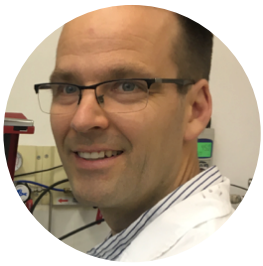
CIVIL AND ENVIRONMENTAL ENGINEERING SEMINAR SERIES



Mengqiang Zhao
New Jersey Institute of Technology

Christopher J. Arnusch
Ben-Gurion University of Negev

Antiviral MXene-Laser-Induced Graphene Composite Air Filters

The ultimate target of this project is to achieve the fabrication of MXene- laser-induced graphene (LIG) composite surfaces with enhanced electrical conductivity for virus inactivation. LIG is a technology uniquely positioned to advance applications where electrically conductive carbon coatings are required. It has been demonstrated in both air and water filtration, and anti-fouling, anti-viral, and anti-bacterial properties were observed. On the other hand, MXenes are a family of novel two-dimensional (2D) materials with superior electrical conductivity. A combination of LIG with MXenes is expected to provide much-improved surface electrical conductivity and enhanced antiviral activities. During the past 4 months of the funded project, we have successfully prepared a series of polyimide (C-P84) non-woven supported LIG air filters. The LIG was formed in-situ on the surface of polyimide fibers with a good graphitization degree. Besides, single-layer Ti3C2Tx MXene flakes with a size ranging from 100 nm to ~2 m were synthesized in both water and ethanol, forming stable colloidal solutions with a concentration up to 200 mg/mL. Using the spray coating method, we have fabricated a series of MXene-LIG composite surfaces with different MXene loadings and flake sizes. Detailed characterizations of the structure and air filtration properties of the composite surface are to be carried out.

Christopher J. Arnusch was born and raised in Canada but moved to the Netherlands for a Ph.D. in medicinal chemistry. He came to Israel in 2008 for a postdoc at the Weizmann Institute in biological chemistry and is now an Associate Professor at Ben Gurion University where he applies his knowledge towards developing new materials for environmental applications. He is currently fascinated by laser-induced graphene, which is a technique that can generate graphene-based carbon coatings on polymer substrates. These coatings were found to be antimicrobial on polymeric water and air filters, but they can also be used in other applications such as adsorbents and graphene-based sensors.

Mengqiang Zhao is an Assistant Professor in the Department of Chemical and Materials Engineering at the New Jersey Institute of Technology. He obtained his Ph.D. degree in Chemical Engineering from Tsinghua University. After graduation, he worked as a postdoctoral researcher in Prof. Yury Gogotis' group at Drexel University and Prof. A.T. Charlie Johnson's group at the University of Pennsylvania. His research interests focus on the development of low-dimensional materials for energy, environmental, and health applications.

Thursday, November 4th, 2021 I 10:00 AM ET I 4:00 PM Israel

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