CRC Seminar Series

DATE: 4 November 2021
TIME: 3:00 PM – 5:00 PM
LOC: Online Zoom Meeting

GUEST SPEAKER:

Prof. Yury Gogotsi
Drexel University, Department of Materials Science and Engineering

TITLE:

„The World of Two-Dimensional Carbides and Nitrides (MXenes)"

ABSTRACT:

Discovery of new materials provides moments of inspiration and shifts in understanding, shaping the dynamic field of materials science. Following the graphene breakthrough, many other 2D materials emerged. Although many of them remain subjects of purely academic interest, others have jumped into the limelight due to their attractive properties, which have led to practical applications. Among the latter are 2D carbides and nitrides of transition metals known as MXenes [1]. The family of MXenes has been expanding rapidly since the discovery of Ti_3C_2 in 2011. More than 30 different stoichiometric MXenes have been reported, and the structure and properties of numerous other MXenes have been predicted. Moreover, the availability of solid solutions on M and X sites, multi-element high-entropy MXenes, control of surface terminations, and the discovery of out-of-plane ordered double-M *o*-MXenes (e.g., Mo_2TiC_2), as well as in-plane ordered *i*-MAX phases and their *i*-MXenes offer a potential for producing dozens of new distinct structures. This presentation will describe the state of the art in the manufacturing of MXenes, their delamination into single-layer 2D flakes and assembly into films, fibers and 3D structures. Synthesis-structure-properties relations of MXenes will be addressed on the example of Ti_3C_2. The versatile chemistry

of the MXene family renders their properties tunable for a large variety of applications. In particular, the interaction of MXenes with electromagnetic waves can be controlled via their composition and structure. Many MXenes offer high electronic conductivity and outstanding electromagnetic interference shielding. They can also be used in telecommunication, energy, medical and electronic device applications.

1. A. VahidMohammadi, J. Rosen, Y. Gogotsi, The World of Two-Dimensional Carbides and Nitrides (MXenes), ***Science***, **372**, eabf1581 (2021)

PROFILE OF PROF YURY GOGOTSI:

Yury Gogotsi is Distinguished University Professor and Charles T. and Ruth M. Bach Professor of Materials Science and Engineering at Drexel University. He also serves as Director of the A.J. Drexel Nanomaterials Institute. His research group works on 2D carbides, nanostructured carbons, and other nanomaterials for energy, water and biomedical applications. He is recognized as Highly Cited Researcher in Materials Science and Chemistry, and Citations Laureate by Thomson-Reuters/Clarivate Analytics. He has received numerous awards for his research including the ACS Award in the Chemistry of Materials, Gamow Prize, European Carbon Association Award, and S. Somiya Award from IUMRS. He has been elected a Fellow of the World Academy of Ceramics, the European Academy of Sciences, American Association for Advancement of Science, Materials Research Society, American Ceramic Society, the Electrochemical Society, Royal Society of Chemistry, and the International Society of Electrochemistry. He holds honorary doctorates from several Universities in France and Ukraine. He served on the MRS Board of Directors and is acting as Associate Editor of *ACS Nano*.