Plenary Lecture
Room Town & Country A - Session PL-MoM

Plenary Lecture

Moderator: Johanna Rosen, Linköping University, Sweden

8:00am **PL-MoM-1 Welcome and Opening Remarks**,

8:20am **PL-MoM-2 Engineering 2D MXene Surfaces for Functional Films and Coatings**, ***Yury Gogotsi (yg36@drexel.edu)***, Drexel University, USA

INVITED

MXenes (carbides, nitrides, oxycarbides and carbonitrides of early transition metals) are a very large family of 2D materials. They have a chemical formula of $M_{n+1}X_nT_x$, where M is a transition metal (Ti, Mo, Nb, V, Cr, etc.), X is either carbon and/or nitrogen (n=1, 2, 3 or 4), and T_x represents surface terminations (O, OH, halogens, chalcogens). The large variety of structures and compositions, availability of solid solutions on M and X sites, and control of surface terminations offer a plethora of materials to produce and investigate.[1] Combining their plasmonic properties with ease in aqueous processing, high electronic conductivity (over 20,000 S/cm), biocompatibility, and excellent mechanical properties, which exceed other solution-processable 2D materials, MXenes have the characteristics enabling numerous applications.[2]Inherent to their 2D structure, the charge carriers responsible for MXene's optical responses and electronic transport are very close to the surface that has an exceptional ability to undergo reversible chemical and electrochemical reactions to add or change surface terminations. MXenes can be applied to a variety of surfaces to provide electronic and ionic conductivity, control optical properties in a wide range of wavelengths, produce electrochromic films, and even achieve a low friction coefficient. Polymers, paper, and fabrics coated by MXenes from aqueous or organic solutions acquire unique surface properties. The properties of MXene coatings can be optically or electrochemically modulated. Many technological advances can be enabled by these chemically and optically responsive conductive coatings.[1,3,4]

References

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3. M. Han, D. Zhang, C. E. Shuck, B. McBride, T. Zhang, R. (John) Wang, K. Shevchuk, Y. Gogotsi, Electrochemically Modulated Interaction of MXenes with Microwaves, *Nature Nanotechnology,* 18 (4), 373–379 (2023)

4. D. Zhang, R. (John) Wang, X. Wang, Y. Gogotsi,*In situ* monitoring redox processes in energy storage using UV-Vis spectroscopy, *Nature Energy*, 8, 567–576 (2023)

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