



## **Birck Seminar Series**

Recent MXene developments at Purdue and  
potential for collaboration at Birck

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**Zoom Link: <https://purdue-edu.zoom.us/j/99524580757>**

### **Abstract:**

Two-dimensional (2D) transition metal carbides, nitrides, and carbonitrides, known as MXenes, have grown in the past decade from a newly discovered material to a large family of 2D materials. MXenes have a wide array of material properties, including solution-processability and hydrophilicity (surfactant-free nanoinks), high electrical conductivity and 2D stiffness, functionalized surfaces, and chemical and structural tunability. MXenes have been extensively investigated for applications such as energy storage, catalysis, sensing, biomedical, electromagnetic interference shielding, and wireless communications.

In this talk, I will begin by presenting unique aspects of MXenes, including their processability as nano inks and their potential use in electronics. Then, I will delve into the recent developments and projects that we started in the past four years in Indiana, including the first report on high-entropy MXenes, the expansion of ordered double-metal MXenes, the introduction of tungsten-titanium MXene, and exploring rare-earth MXenes and their potential applications which require collaborative studies. Lastly, I will discuss our recent findings on MXenes for extreme environments and potential use in hypersonics and conclude by presenting a few fundamental questions about these 2D materials, which we can aim to address through our collaborative efforts at Birck.

### **Biography:**

Dr. Babak Anasori is the Reilly Rising Star Associate Professor at the Schools of Materials and Mechanical Engineering here at Purdue and the Editor-in-Chief of the *Graphene and 2D Materials*, a *Springer-Nature* journal. Dr. Babak Anasori received his Ph.D. at Drexel University in 2014 in the Materials Science and Engineering Department, the birthplace of MXenes. Dr. Anasori has more than 170 refereed publications on MXenes and their precursors, and he is among the *Web of Science* Highly Cited Researchers from 2019 to 2023. He is also 4th on the 2023 list of Rising Stars of Science in the USA by Research.com. In 2023, he was identified by ScholarGPS as the number #1 in Mechanical Engineering among all scholars in the USA in the past five years. He has received several international awards, including the 2016 Materials Research Society (MRS) Postdoctoral Award, the 2021 Drexel University 40-under-40, the 2021 WIN Rising Star Award in Nanoscience and Nanotechnology, and the 2024 Abraham Max Distinguished Professor Award at IUPUI. Dr. Anasori's research lab works on developing novel 2D carbide and carbonitride MXenes for various applications, including energy generation, electromagnetic interference shielding, and ultra-high temperature ceramics.