

## Synthesis of MXenes (one-day course)

Lead Instructor: **Dr. Christopher Shuck**

Organizer: **Prof. Yury Gogotsi**

In this course we will cover synthesis of MXene by various wet etching methods. At the end of the course you will learn how to (i) correctly select the etchant and etching conditions for MXene synthesis, (ii) properly perform washing and prepare high-quality MXene with high yield (iii) delaminate MXene and prepare colloidal solution (and even process them into films). If you need to learn how to conduct synthesis of MXenes, improve the yield/quality or move beyond  $Ti_3C_2T_x$  – this course is for you.

- Introduction to synthesis of MXenes (Lectures)
  - Fundamentals of Etching
    - Safety during etching
    - Difference between etching approaches
    - Effect of etching procedure on structure and properties
  - Fundamentals of Delamination
    - Effect of different intercalants/delaminants
  - Processing and Storage
- Etching/delamination applied to different MXenes (Lectures)
  - $Ti_2CT_x$  (HF, LiF/HCl)
  - $V_2CT_x$  (HF, HF/HCl)
  - Other MXenes
- Lab demonstration of etching/delamination of  $Ti_3AlC_2$  (groups of five)
  - Demonstration of safe etching protocols
  - Pure HF (5, 10, 30% HF) and HF/HCl
  - LiF/HCl (Simultaneous etching/delamination)
    - Delamination of  $Ti_3C_2T_x$  (HF, HF/HCl and LiCl/TMAOH)
- Interactive Question and Answer Session (Bring your data/problems!)

