



Ing. Matěj Velický, Ph.D.

A Few Ångströms Is All We Need: Electrochemistry in Two Dimensions

10 am, Tuesday, February 2nd 2021, J. Heyrovský Institute

Video stream at

https://www.jh-inst.cas.cz/scientific_meetings

Matěj Velický is an Associate Scientist at the J. Heyrovský Institute of Physical Chemistry, CAS. He focuses on combining cutting-edge electrochemistry and spectroscopy with the exciting world of two-dimensional materials. His major research contributions include development of a microscale spatially-localized electrochemical interrogation technique, realization of a record-size monolayer MoS₂/gold heterostructure with unique electrochemical properties and verification of unproven predictions from the Marcus-Hush theory. He obtained a PhD in Chemistry from the University of Manchester (UK) in 2011.

Miniaturization of electrochemical energy storage and conversion is necessary for the development of increasingly more efficient, sustainable, and portable technologies. However, structural limitations in bulk materials make further shrinking of such ultrathin devices increasingly difficult and expensive to deliver. Two-dimensional (2D) materials offer a promising alternative, due to their electronic tuneability, sub-nanometer thickness, and enormous surface-to-volume ratio.

I will first highlight some of my achievements in this field and then outline a roadmap towards “*Tunable electrochemistry of two-dimensional semiconductors*”. This research program will exploit the extreme tunability of the electronic structure of 2D semiconductors through charge doping, substrate effects, and long-lived excitons, in order to achieve control over their electrochemical properties. My research will open up a new area of tunable electrochemistry, develop cutting-edge spectroelectrochemical characterization, and lead to highly efficient energy storage and conversion solutions in two dimensions.