DEPARTMENT OF CHEMISTRY AND PHYSICS OF MATERIALS

ANNOUNCEMENT

PARIS LODRON UNIVERSITÄT SALZBURG

Vortragsankündigung

Mittwoch, 19. April 2023, 11.15 Uhr im SR 1

Prof. Dr. Ian D. SHARP

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"Functional Transition Metal (Oxy)nitrides for Solar-driven Water Splitting"

The capture of sunlight and its direct conversion to chemical fuels in artificial photosystems provides a promising route to sustainably meet future energy demands. However, a major challenge is the development of semiconductor photoelectrodes that can simultaneously harvest visible light, direct photogenerated carriers to catalytic sites, and remain stable in reactive environments. To address this central materials challenge, we investigate complex transition metal (oxy)nitride semiconductors, in which fundamental questions regarding basic electronic structure, photocarrier transport, and interfacial chemistry must be addressed. Here, we utilize non-equilibrium deposition methods to tune the composition and structure of Ta- and Zr-based (oxy)nitrides. Our results indicate a critical role of oxygen in defining the synthetic accessibility, phase stability, and electronic properties of the resulting films. Using a complementary suite of optical, electronic, and X-ray characterization methods, we show how defects, crystal site disorder, and interface properties impact light-to-chemical energy conversion processes in this promising, yet complex, class of materials. In addition, we show how interfaces can be stabilized and activated via the integration of atomic layer deposited catalytic coatings, thus providing a basis for integrated photoelectrodes that can support efficient and robust solar-to-fuel conversion processes.