Synthesis of oxynitrides for photocatalysis

Transition-metal oxynitrides, materials with both O and N anions, are emerging photo- and electro-catalytic materials due to their unique physical, chemical and opto-electronic properties. Oxynitrides are synthesized by sputtering a target in an oxygen-plasmas. First results are promising when tested in a hydrogen-fed reaction, and need further reaction studies. Pd based reaction pathways and plasma treatments combined with DFT calculations, allows more tailored synthesis of these oxynitrides.

Thin Film Growth of TaO-N

In situ Synthesis of TaO-N and MoO-N

Interfacial Science

INTERFACIAL SCIENCE

by its very nature brings together a diverse interests in oxide films, catalysis, semiconductors, nano-science, bio-membranes, surface physics, corrosion, and electrochemistry.

WRi is of interest as a 2D semiconductor (2D) with a direct band-gap. Due to low doping levels, it is an intrinsic 2D and shows ambipolar transport. This affords the possibility to realize devices with the Fermi level in the valence band, where the sp-valley coupling is strong and leads to novel and interesting physics.

Characterization of 2D transition metal dichalcogenides

Growing 2D materials epitaxially on single crystal substrates provides a means for controlling their orientation.

AFM image showing the triangular shaped WS2 monolayer on Al2O3

Thin Film Growth of TaO-N

From Left: Guenna, Achari, Prof. Bedzyk, Anushuela, Kathy, Roger, Elise, Bruce, Joey, Rachel, Carlos, Sumit, Yanna, Anthony, Jerry.

Atomic-scale x-ray interface studies of heterogeneous catalytic systems

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