

Webinar

Electrode and Electrode-Electrolyte Interface Engineering for Heterogeneous Catalysis

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Electrode-electrolyte interfaces are usually thermodynamically unstable but set the stage for a wide range of fundamental processes such as catalysis. A deeper understanding of some of these ubiquitous and important electrode-electrolyte interfaces will be helpful in manipulating the inherent catalytic activity of well-known surfaces such as Platinum (Pt), Gold (Au), Copper (Cu) etc. Our studies showed that the electrochemical hydrogen evolution reaction (HER) of polycrystalline Pt surface can be modified by wrapping it with a few layered hexagonal boron nitrides (hBN). In such a case, Pt will be chemically protected by the atomic layer while its HER activity seems to be enhanced. In a different work, it is shown that even non-permanent modification of metal or non-metal surfaces by interfacial electrolyte engineering can be achieved, which in turn affects the catalytic performance of the solid surfaces. This has been achieved by electrode-electrolyte interface engineering using highly concentrated lithium based 'water in salt' type electrolytes, where it can help other catalytic processes like electrosynthesis of ammonia too. It is further shown that interfacial as well as bulk 'water structure' of the aqueous electrolyte is an important descriptor in HER performance, particularly in alkaline medium. These results will be discussed during the presentation.

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