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Szeminárium

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Activating the basal plane of a 2D chalcogenide for electrocatalytic hydrogen evolution reactions

Renewably-generated power is plentiful, but there remains the problem that it must be used as it is generated or else be wasted. In order to make the most of our renewable power resources we must find ways to store renewably-generated electricity for later use. An attractive way to do this is to store the energy as a chemical fuel. A device called an electrolyser uses electricity to split water over relevant electrocatalysts into hydrogen and oxygen. The hydrogen can be stored as a fuel, which can later be used in a fuel cell or combustion engine to release the stored energy.

Initially I will briefly review the state-of-the-art electrocatalytic systems and recent progress in hydrogen evolution reactions from water splitting. I will then move on the primary focus of my talk by discussing our recent work on transition metal dichalcogenides which have been increasingly popular choice as solid state electrocatalysts. The layered structure of chalcogenides makes their surfaces look like East-Asian terraced rice paddies, consisting of terraces (basal plane) intertwined with steps (edge sites). With very few exceptions only edge-sites has been shown to be active for electrocatalytic reaction, while the basal planes, despite being the predominant feature of the surface, were considered inactive. In my lecture I will show how we can activate basal planes through a new electrochemical cycling protocol and the interplay between two polymorphs in Mo-Te system. Combination of these two approaches has already led to significant improvements in electrocatalytic activity suggesting that maximizing the output from the entire surface of the transition metal chalcogenides is a very effective route for substantial improvement in design and efficiency of water splitting devices.

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I. épület, Tanácsterem

Az előadás nyelve: angol

Minden érdeklődőt szívesen látunk!