TIFR Centre for Interdisciplinary Sciences
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Students' Annual Seminar

Covalently and Non-covalently Coupled Nanostructures for Hydrogen Evolution Reaction

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Cost effective methods for carbon neutral/negative renewable fuels are receiving tremendous attention in recent research. Hydrogen is identified as one of the best carbon-negative renewable futuristic energy sources, and water electrolysis (electrochemical water splitting) is identified as the best method to produce H2 without the emission of greenhouse gases. Recently, we have observed high hydrogen evolution reaction (HER) activity from the hybrids of some of the structured nanomaterials such as carbon nanotubes (CNTs), atomic layers such as graphene and MoS2. These nanomaterials individually show no/negligible HER activity, while they connected through covalent interconnects or van der Waals stacking, enormous HER activity is found to be emanating from the hybrids. The HER activities of these hybrids are studied in detail and we also studied the molecular mechanism leading to these enormous activities. In atomic layers based photo-electrocatalysis, role of a factor called 'stacking sequence' is also established through our studies.

Reference:

1. Covalently Connected Carbon Nanotubes as Electrocatalysts for Hydrogen Evolution Reaction through Band Engineering, ACS Catalysis 7, 2676-2684 (2017).
2. Hydrogen Evolution Reaction Activity of Graphene-MoS2 van der Waals Heterostructures, ACS Energy Letters DOI:10.1021/acsenergylett.7b00349 (2017).

Thursday, June 1st 2017

04:00 PM (Tea/Coffee at 03:45 PM)

Seminar Hall, TCIS