Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Internal Webinar

Investigation of Nano-Carbon/Non-Carbon Material Interfaces for Renewable Energy Conversion and Storage Device

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Investigation of the interfacial properties of nano-carbon/non-carbon material is an interesting topic of research. It is known that a specific interfacial property leads to a projected application of interest. The different interfaces of carbonaceous material along with non-carbon matrix have potential application in the field of renewable energy conversion and storage device. Among all the existing renewable energy resources, hydrogen energy via water splitting is the most environmentally benign and has already captured a prime place in recent technological developments. Despite enormous improvements in the development of carbon-based electrocatalysts for water splitting, it is still challenging to improve their catalytic activities to compete with the noble metal-based electrocatalysts. The main problem of the carbon-based catalyst is the stability, lack of active site and leaching of weakly bonded catalyst which can hinder its practical application. To overcome these prevailing unavoidable circumstances, there can be an alternate possibility for the betterment of stability as well as the exposure of catalytic sites via stitching 2D graphene with 1D carbon nanotube in a single platform for the distribution of electrons in 3-dimensional space along with the exposure of electroactive sites. This may impart a unique electrical property and help to create more active surface area by loading the catalysts on top of the graphene-CNT matrix. In this talk, the different carbonaceous interface (graphene, 3D-graphene, CNT, NGQD, g-C_3N_4) along with non-carbon material (Ni_2P, Ni_2P-CuP_2, Cu_3P, Sn_4P_3 Silicon Nanowire etc.) will be discussed which can create a unique avenue for the new type of catalyst design for water splitting and energy storage supercapacitor application. In addition, further, development can also lie in view of metal-free photoelectrochemical water splitting via tuning the semiconducting silicon matrix with the help of either p-i-n heterostructure or p-n junction semiconductor interface along with the zero-dimensional NGQD quantum dots.

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14:00 Hrs