Contribution ID: **24** Type: **Oral**

Engineering of MoS2 quantum dots/PANI aerogel for high energy supercapaciator and hydrogen evolution electrocatalyst

The low conductivity of MoS2 presents a huge barrier for the exploitation of its supercapaciator electrode application and hydrogen evolution reaction (HER) catalyst. To alleviate this difficulty, we have synthesized MoS2 quantum dots (QDs) having greater quantity of catalytic edge sites by breaking up bulk MoS2 sheet using the solvent exfoliation technique. The synthesized MoS2 QDs are embedded into polyaniline (PANI)-N,N′-dibenzoyl-L-cystine (DBC) aerogel matrix for high energy supercapaciator and HER catalyst. Here, conductive PANI matrix are prepared by in situ polymerization of aniline where DBC acts as a gelator, dopant, and cross-linker. The DBC-PANI aerogel shows conductivity of 0.02 S/cm, specific capacitance of 278 F/g at a current density of 1A/g. The optimal MoS2 QDs in DBC-PANI aeogel improves specific capacitance up to 796.2 F/g at 1A/g with superior rate capability (582 F/g at 20 A/g), and long cycling stability (86% after 5000 cycles). Also, the hybrid conductive DBC-MoS2-PANI aerogels thus produced act as an efficient electrocatalyst showing lower HER overpotential in comparison to MoS2 sheets and MoS2 QDs. It exhibits an optimum overpotential value of 196 mV at 10 mA cm−2, a favorable Tafel slope of 58 mV/dec, and an excellent electrocatalytic stability. Here, porous aerogel facilitate the fast diffusion of electrons/ions in the electrode, which can achieve high energy supercapaciator and the HER catalysis.

1. S. Das et al., *ACS Appl. Mater. Interfaces* 8 (2016), 28055-28067.
2. X. Geng et al., *Adv. Funct. Mater.* 24 (2014), 6123-6129.

Preferred topic

Gels and nanoparticles

Primary authors: Prof. NANDI, Arun. K. (Indian Association for the Cultivation of Science); Mr DAS, Sujoy (Indian Association for the Cultivation of Science)

Presenter: Mr DAS, Sujoy (Indian Association for the Cultivation of Science)