

Electrodeposition of Hydrogen Adatoms on Graphene

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Conductive carbon materials, such as graphite, glassy carbon, carbon black, carbon nanotube, graphene, etc., are used extensively as electrode materials or catalyst carriers in various electrochemical researches because it is inert in the electrode/electrolyte environment. It is well known that the under potential deposition (UPD) of hydrogen adatoms has never been observed on carbon materials. We proposed, designed and demonstrated a “spillover-surface diffusion-chemical adsorption” system, and realized the stable chemisorption of atomic hydrogen on graphene by using platinum as catalyst and proton or water as hydrogen source. The experimental results of Raman spectroscopy evidenced the existence of C-H adsorption bond. The kinetics of surface diffusion of hydrogen adatoms on graphene were also measured. This phenomenon is valuable for the hydrogen energy.

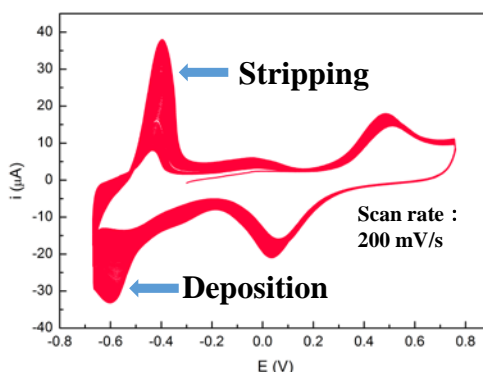


Fig. 1 The cyclic voltammogram of electrochemical deposition and stripping of hydrogen adatoms on a platinum sheet supported single layer graphene composite electrode in 0.5 M H₂SO₄ solution.