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## Polyaniline – an alternative electrocatalyst for hydrogen storage and hydrogen evolution reaction

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HCl doped polyaniline is coated on copper substrate and used as electrode to study hydrogen evolution reaction in 1 M H<sub>2</sub>SO<sub>4</sub> and 1 M NaOH electrolyte solutions. The predominant mechanism for hydrogen evolution reaction in acidic medium is of Heyrovsky type and follows Grotthuss mechanism, where the proton hops randomly on the surface of polyaniline. Employing Randles-Sevcik equation, the diffusion coefficient of H<sup>+</sup> on polyaniline is calculated and the average value is approximately three times higher than the literature data. This clearly demonstrates the rapid diffusion of H<sup>+</sup> on the polyaniline surface from bulk electrolyte solution. In basic medium, hydrogen gas evolution follows Volmer type and polyaniline undergoes oxidation. With the help of phenomenological thermodynamic approach demonstrated elsewhere, the solvent modified work function of polyaniline modified copper in both acidic and alkaline medium were calculated. The plot of exchange current density versus solvent modified work function of different metals and polyaniline coated copper indicates that: (1) Polyaniline coated copper possessing higher exchange current density at lower work function in comparison to copper; and (2) the rate of hydrogen evolution is much higher on polyaniline coated copper than simple copper.

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