

THE EFFECT OF STABILIZING AGENT ON PLATINUM NANOPARTICLES AND IMPLICATIONS TOWARDS THE OXYGEN REDUCTION REACTION

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ABSTRACT

The stability of precious metals under acidic conditions is a potential issue for several applications including proton exchange membrane fuel cells (PEMFCs). Incorporating stabilizing agent like polypyrrole is one of the strategies to addressing this issue. In particular, organic stabilizing agents, which aid the regulation of nucleation rates of nanoparticles, have been studied for such applications. In this work, the stability of 3nm Pt nanoparticles was studied under acidic conditions with poly (N-vinyl-2-pyrrolidone) (PVP) as capping-agent. The Pt nanoparticles were generated using a combination of Hexachloroplatinic acid (H_2PtCl_6), (PVP), methanol, and water under reflux synthesis. The metal ion reduction rate was controlled by varying alcohol concentration and surfactant amount. Washed and unwashed particles were characterized by Transmission Electron Microscopy (TEM) and tested via electrochemical and traditional catalytic techniques. Detailed results of this work are presented in the paper, and potential implications for the oxygen reduction reaction and PEMFCs are discussed.