

Electrochemical deposition of platinum nanoparticles on carbon supports

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There is much research interest in supported platinum nanoparticles, especially for their use as catalysts in fuel cells. The catalytic performance of nanoparticles is crucially dependent on their size, shapes and distribution on the support. Uniformly dispersed smaller particles with uniform size and shape are normally desired. But it is found that the sizes of electrodeposited particles vary significantly and particles tend to agglomerate. The current work aims to develop a bath for electrodeposition of platinum nanoparticles on carbon support and to control their size, shape and distribution.

In the present study, we have developed a bath from which platinum nanoparticles with relatively uniform size and shape can be deposited on carbon substrate. The deposition parameters and nucleation and growth mechanisms have been studied by electrochemical experiments such as cyclic voltammetry, chronoamperometry. It has been found that the particle size and distribution can be controlled by changing bath compositions and electrochemical parameters. The catalytic property of the carbon supported platinum nanoparticle electrodes has also been tested for the oxidation of methanol and phenol.