

Preparation of Ultrastable Pt nanoparticles on the sulfur-containing ordered mesoporous carbon support

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A facile route for the preparation of ordered mesoporous carbon (OMC) containing sulfur atoms inside the framework is developed. *p*-Toluene sulfonic acid (TSA) is used as both of carbon precursor with S-C bond and carbonization catalyst instead of sulfuric acid. After synthesis of the sulfur-containing OMC (S-OMC), Pt nanoparticles was introduced with 60 wt% onto the S-OMC by modified polyol process. The Pt nanoparticles in the S-OMC exhibited extraordinarily high thermal stability, which might be due to the metal-support interaction induced by the sulfur atoms in the framework of the S-OMC. After heat treatment at 600°C, the particle size of Pt in the S-OMC was maintained below 5nm, while the particle sizes of Pt in the OMC and conventional carbon black exceeded 8nm and 25nm, respectively. XPS spectra suggested that the S atom interacted strongly with Pt nanoparticles and modified slightly the electronic structure of Pt nanoparticles. The electrochemical stability of Pt nanoparticles in S-OMC support was also investigated.