

Single-step formation of copper nanoparticles encapsulated in carbon composites

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Much attention has been paid to the development of inexpensive metal nanoparticles in a low cost and convenient way to meet the ever-growing needs. Copper nanoparticles become one of the most promising replacements in catalytic, electrical and magnetic fields, but they are vulnerable to oxidation in air. It is inevitable that they are required to be coated or embedded in other materials such as silver, carbon and polymers for maintaining the desired metallic property. In general, after the preparation of core copper nanoparticles, coating and encapsulation have been successively conducted, the two-step method requires additional operating time and cost. Accordingly, recent efforts for preparing stable copper nanoparticles in air have now shifted towards developing efficient synthetic method.

Here, a facile, single-step and inexpensive method of using spray pyrolysis has been developed to synthesize copper nanoparticles encapsulated in carbon composites. The variations in morphology of copper/carbon composites as a function of the PVP to copper salt ratio are observed by Transmission Electron Microscopy. Furthermore, the improvement of stability in air has been demonstrated by X-ray photoelectron spectroscopy.