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Shape control synthesis of silver hierarchical microcrystals

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Abstract

Effective efforts have promoted the development of the shape controlled synthesis of silver nanoparticles in recent decades. However, there was limited success in the morphology controlled synthesis of silver microcrystals, especially large scale synthesis in aqueous solutions. Here, series of mono-dispersed silver hierarchical microcrystals (AgHMCs) with high yield have been produced by the reduction of silver nitrate with ascorbic acid in nitric acid-mediated aqueous solutions (Fig.1). The physical characterization revealed that (111) facets become dominant exposed on the surface of nano- or submicro-Ag planes, which assembled to form AgHMCs. It is suggested that the oxidative etching effect of nitric acid and selective deposition of reduced Ag atoms based on surface free energy took mainly effect in determining the formation of AgHMCs.

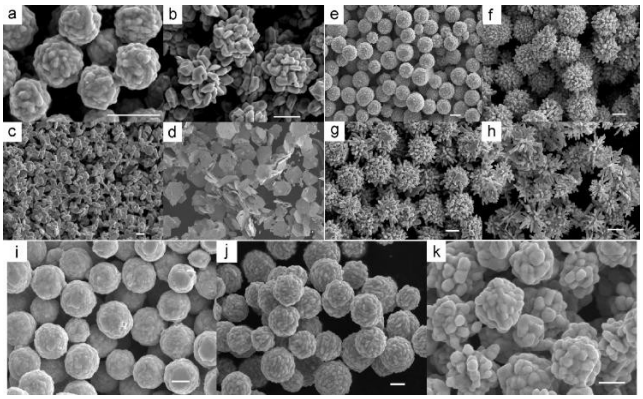

Fig.1 *FESEM images of AgHMCs formed in different reaction parameters: (a)-(d), HNO_3 doses: (a) 0, (b) 0.07, (c) 0.21 and (d) 2.1 mol/L; (e)-(h), ethanol doses: (e) 0, (f) 150, (g) 250 and (h) 500 ml/L; (i)-(k), reaction temperatures: (i) 2, (j)25 and (k) 45 °C. The scale bar is 1 μm.*

Keywords

Silver, hierarchical microcrystals, control synthesis

Biography

Zhi-ying Zhang obtained his Ph.D. in chemistry at the Technical Institute of Physics and Chemistry, Chinese Academy of Sciences in 2006. He continued his work at the Technical Institute of Physics and Chemistry, Chinese Academy of Sciences. His Research focus include preparation of silver nano/micro particles, silver ink for printed electronics and others.