Synthesis and characterization of faceted bimetallic nanoparticles

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Nanoparticles of noble metals are of great importance as they present diverse applications in several fields, such as in biomedicine, catalysis, optics and electronics.[1] However, bimetallic nanoparticles of noble metals are showing an advantage over monometallic ones, not only because they could combine the properties of each component, but also due to synergetic effects between two different metals.[2] Monometallic and bimetallic nanoparticles of noble metals with defined shape and size attract more and more attention the last decades thanks to their tunable properties and applications especially in catalysis and electrocatalysis.[3][4]

In this work, core-shell nanocubes consisting of two coin metals, e.g. silver (Ag) and gold (Au), were synthesized. Ag cubes (Fig. 1) were prepared according to a modified protocol, originally developed and introduced by Xia *et al*. Core-shell, Ag@Au, structures were then generated via a seed-mediated growth approach.[5] Ag nanocubes were used as seeds and the precursor, tetrachloroauric (III) acid ($HAuCl_4$), was titrated under controlled conditions. A mild reducing agent, ascorbic acid, was used to reduce the Au precursor while pH level was suitably adjusted, in order to suppress the galvanic replacement reaction.[6] Both Ag and core-shell Ag@Au nanocubes were fully characterized by ultra violet and visible spectroscopy, dynamic light scattering, scanning electron microscopy, energy dispersive X-ray spectroscopy, atomic absorption spectroscopy and X-ray powder diffraction.

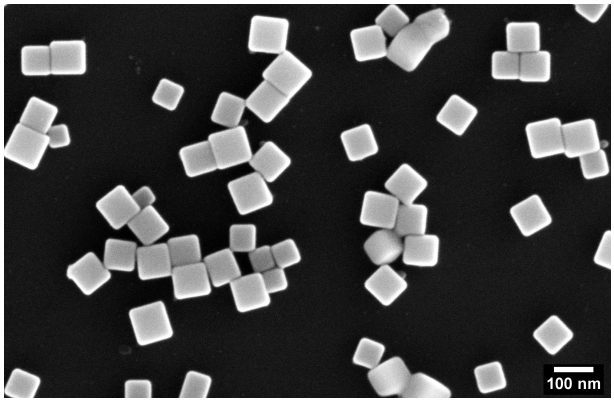

Fig. 1 Scanning electron microscopy image of the synthesized silver nanocubes.

Literature

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