

### Shape- and Composition-Sensitive Activity of Pt and PtAu Catalysts for Formic Acid Electrooxidation

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In this work, we report a comparative and systematic study on the variation of activity toward formic acid oxidation with different shapes and compositions of Pt-based nanostructures. Pt hollow nanospheres (Pt HNS), Pt nanotubes (Pt NT), and PtAu alloy nanotubes (PtAu NT) with controlled Pt:Au compositions are prepared via a galvanic replacement process using sacrificial Ag templates. Relative to the commercial Pt black and Pt/C nanoparticle catalysts, the hollow nanostructured Pt materials (Pt HNS, Pt NT) exhibit enhanced catalytic activities due to structural effects. Moreover, the bimetallic PtAu NT series shows improved catalytic activities over the monometallic Pt catalysts due to compositional effects. This study clearly demonstrates that the shape- and composition-dependent activities of the various nanostructured catalysts are exemplified by formic acid oxidation. This work was supported by the NRF (no. 20120005212) and the Global Frontier R&D Program (no. 0420-20110157) of the MEST, and the KETEP (no. 20093020030020-11-1-000 and no. 20103020030020-11-2-200).