Tuning Optical Properties of Bimetallic Nanostructures using Galvanic Replacement

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**Abstract**. A flexible bottom-up technique called galvanic replacement can be used to create a range of metallic nanostructures with precise control over their size, composition, and shape. Through a chemical interaction between a sacrificial metal and a noble metal precursor, metal ions are reduced onto a pre-existing template in this process. Galvanic replacement offers high-throughput, low-cost, and tunable synthesis of nanostructures with uses in catalysis, sensing, imaging, and energy conversion. In this review, we summarize the recent advancements in the synthesis and characterization of galvanic replacement of bimetallic nanostructures, with a focus on the mechanisms and optical tuning through this method. We emphasise how the concentration of the precursors, the sacrificial metal, pH, temperature, and other variables have helped generate simple to remarkable hollow bimetallic nanostructures. These hollow metal nanostructures have surface plasmon resonance peaks tunable in the visible to NIR (near-infrared region). This review gives readers a thorough grasp of galvanic replacement and its potential for rationally designing and synthesising useful nanostructures.