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## Novel properties and applications of plasmonic metal nanostructures: A case study and recent progress on hollow gold nanospheres (HGNs)

Plasmonic metal nanostructures have unique and strongly shape-dependent optical properties useful for various applications including sensing, imaging, energy conversion and therapy. Hollow gold nanospheres (HGNs) is an excellent example and their optical properties can be tuned by varying the diameter and shell thickness for specific and desired applications. However, the mechanism behind the growth of HGNs with Co nanoparticles used as a template remained unclear. We have conducted a detailed mechanistic study and determined that oxygen plays an important and delicate role in the HGN growth process. More specifically, an intermediate species composed of both Co and B seems to be formed after the Co(II) ions are reduced but before the formation of Co metal nanoparticles. An appropriate amount of oxygen is needed to convert the intermediate species into Co metal nanoparticles without further oxidizing them into cobalt oxide. Based on this mechanism, we can exercise much better control over the HGN synthesis in terms reproducibility and structure of the final product. Both *in vitro* and *in vivo* cancer therapy based on photothermal ablation (PTA) has been demonstrated successfully with high efficiency. Key factors affecting PTA have been studied with the long-term goal of achieving optimal efficiency.

### Biography

Jin Z Zhang received his BSc degree in Chemistry from Fudan University, China, in 1983 and his PhD in physical chemistry from the University of Washington in 1989. He was a Postdoctoral Research Fellow at UC Berkeley from 1989 to 1992. In 1992, he joined the faculty at UCSC, where he is currently a Full Professor of chemistry and biochemistry, with research focusing on synthesis, characterization and applications of advanced nanomaterials. He has authored over 320 publications and three books have been serving as a Senior Editor for JPC(L) published by ACS since 2004 and is a Fellow of AAAS, APS and ACS.

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