Siemens Competition
Math : Science : Technology
Regional Finalist

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Project Title: *Temporal-spatially transformed synthesis of novel gold bellflowers with ultrahigh photothermal conversion efficiency for cancer theranostics* (Bioengineering)

Anisotropic gold nanostructures with strong near-infrared absorption have been widely employed as photothermal conversion agents (PTCAs) for cancer theranostics, the simultaneous implementation of diagnosis and treatment. However, the reported PTCAs bear suboptimal photothermal conversion efficiency, which limits their biomedical application. Herein, we fabricated gold bellflowers (GBFs) with ultrahigh photothermal conversion efficiency ($\eta = 74\%$) from a novel liquid/liquid/gas triphasic interface system, using chloroauric acid as a gold source, and *o*-phenetidine as a reducing agent. Originating from the monophasic and biphasic systems used in the creation of gold nanourchins (GNUs) and gold microspheres (GMPs) respectively, the triphasic interface system successfully produced GBFs. The plasmonic properties of GNUs, GMPs, and GBFs were compared, and the possible formation mechanisms of these gold nanomaterials obtained in the different phase systems were investigated and discussed. The photothermal conversion efficiency and photostability of GBFs was determined and compared with the reported PTCAs. The results suggest that GBFs can absorb and convert 808 nm laser energy into heat with ultrahigh efficiency, thus serving as a promising PTCA in cancer theranostics.