Cancer theranosis with uniform mesoporous gold nanoparticles obtained via a new, high-yield synthetic methodology

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Here, we introduce the facile synthesis of scalable, mono-disperse, mesoporous gold nanoparticles (MPGNs) using an acidic emulsification method. This method facilitates high synthetic yields (>93%) and tunable particle sizes (130-400 nm). MPGNs exhibit enhanced payloads of gadolinium (Gd), a contrast agent for magnetic resonance imaging. Additionally, they permit photo-thermal conversion under near-infrared light (NIR) irradiation due to the increased surface area to volume ratio and the unique, structure-mediated LSPR effect. Specifically, MPGNs fabricated using our method provided Gd payloads 2-4 orders of magnitude greater than previously reported theranostic nanoprobes. We believe that our novel synthetic technique will not only contribute to large-scale production of homogeneous porous gold nanoparticles, but will also promote further research in porous noble metal nanostructures.