Synthesis of Highly-branched and Biocompatible Gold Nanoparticle in Lipid Bilayer Vesicle

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Highly-branched metal nanoparticle has attracted considerable interest in a variety of applications ranging from sensing to catalysis, owing to its high surface-to-volume ratio and stronger near-field enhancement. However, since such branched nanoparticle is generally thin and 2D, compared to 3D nanoparticles, the total amount of free electron in the nanoparticle is relatively small, which attenuates the optical property of the particle. To overcome this problem, we propose a method to synthesize highly-branched and biocompatible gold nanoparticle with 3D smaller gold core. 3D gold core would act as an electron supplier to surrounding branches. First, reducing agents are encapsulated within a lipid bilayer vesicle. Then, gold precursor is added to the vesicle solution. The gold core is formed in the lipid bilayer vesicle via the reduction of the gold precursor. Tannic acid and gold precursor are added subsequently to the gold core solution. form highly branched structure. The formation of both the gold core and branches is systematically characterized by TEM and UV-vis spectrophotometer. The effect of the gold core on the optical property of the particle is also investigated.