Synthesis of Nanoparticle-Cored Dendrimers with Single Molecular Weight

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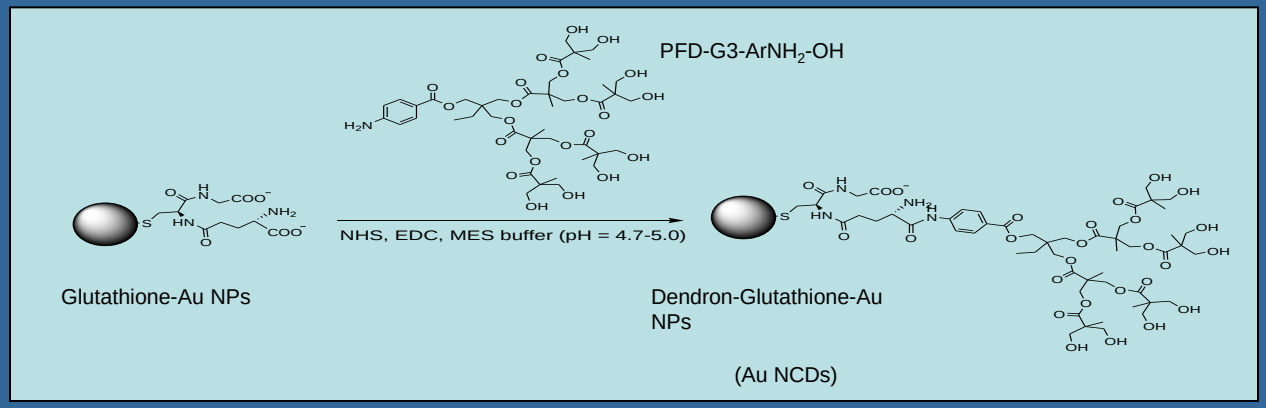
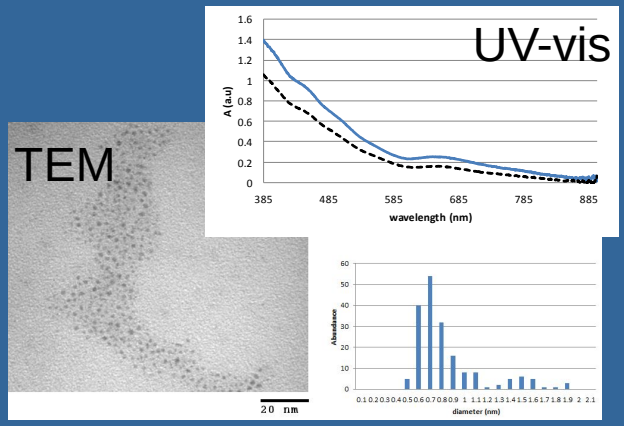
Nanoparticle-Cored Dendrimers (NCDs): New gold nanoparticle-based materials that are composed of particle core and dendron shells.

The primary goal of this research is to synthesize monodisperse nanoparticle-cored dendrimers (NCDs) using our synthetic strategy in which dendrons are linked to functionalized nanoparticles by single coupling reaction. The availability of highly monodisperse NCDs will allow us to further elucidate the relationships between primary structural elements in these nanostructures and their chemical, physical and biological properties.





In an effort to synthesize monodisperse gold NCDs, the synthesis of glutathione-protected Au_{25} nanoparticles was followed by the process of dendron coupling using EDC in the presence of NHS (N-hydroxysuccinimide) and MES (2-(*N*-morpholino)ethanesulfonic acid, pH= 4.7-6) buffer. UV-vis analysis clearly showed distinct peaks corresponding to molecule-like electronic levels of Au_{25} nanoparticles (absorption bands at 680 nm, 440 nm, and 400 nm) even after dendron coupling reactions. Since the unique spectroscopic UV-visible absorption spectra of the Au_{25} core allows us to determine any changes to the size of the gold core as we proceed through the synthesis, the UV-vis result along with TEM results clearly suggested a preservation of Au_{25} core throughout the process.