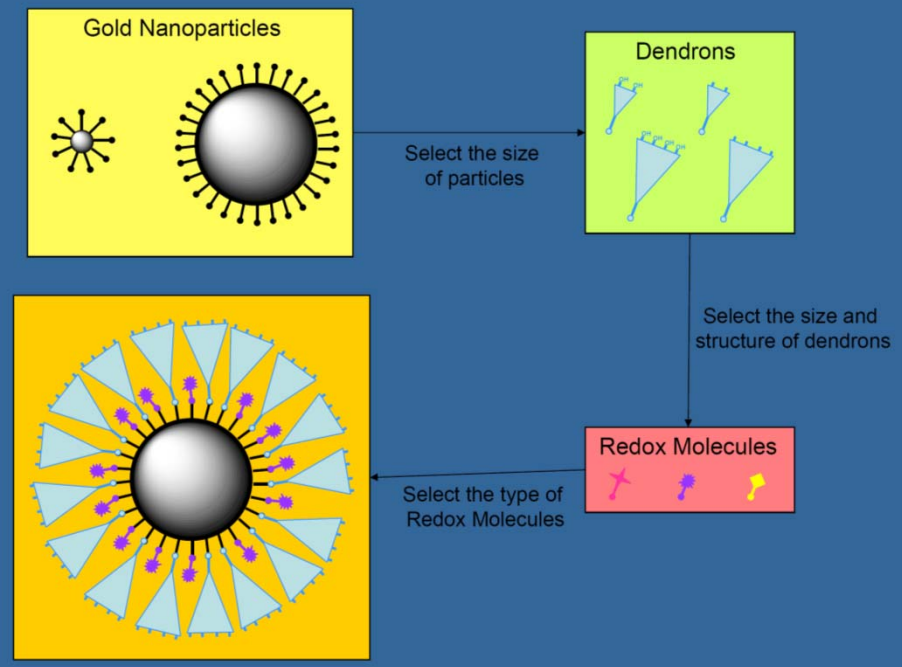
Synthesis of Nanoparticle-Cored Dendrimers with Single Molecular Weight

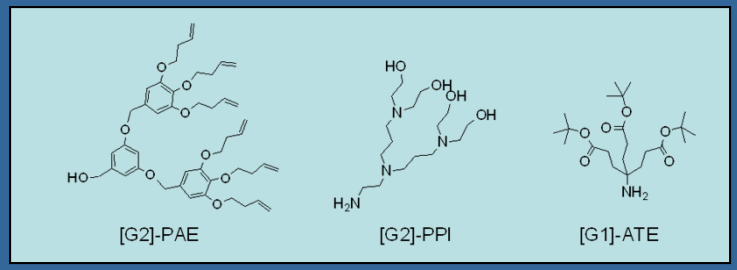
Young-Seok Shon, Department of Chemistry and Biochemistry, California State University Long Beach, Long Beach, CA 90840

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 optical and/or electronic properties.

Each components of the NCDs can be prepared independently, and then put together to produce various dendrimers with different size and composition.





In an effort to synthesize monodisperse gold NCDs, we attempted the coupling reactions between COOH-functionalized Au_{25} nanoparticles (1.1 nm) and HO- or NH_2-functionalized dendrons shown above. Due to the lower stability of Au_{25} nanoparticles and the insolubility of reaction intermediates in organic solvents, the produced NCDs underwent the core size evolution during the reactions. To avoid the problem of size evolution and synthesize monodisperse NCDs, we are currently working on the coupling reaction of water-soluble Au_{25} nanoparticles with water-soluble dendrons.