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## Green synthesis and characterization of stable gold nanoparticles from various fruits juices and fruit waste for biomedical applications

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**S**tatement of the Problem: Gold nanoparticles (AuNPs) have diverse biomedical applications. However, when chemically reduced AuNPs were used in biological tests such as toxicity in various cells, the results often varied. One of important factors which lead to inconclusive results is that the chemicals used to make AuNPs might be still present in the AuNPs solutions used. This study focuses on the green synthesis of gold nanoparticles with fruit juices and fruit wasters without adding any toxic chemicals which is crucial for biomedical applications. Gold nanoparticles with different particle sizes were synthesized by the reduction of HAuCl<sub>4</sub> using only fruit juices/extracts. Similar to fruit juices, fruit wastes such as fruit skins were found to contain various antioxidants and were able to make different sizes of gold nanoparticles. The spherical gold nanoparticles could be controlled by adjusting solution pH to obtain small and narrow size distribution. By adjusting the pHs of the solutions and the chemical reaction step, the sizes of AuNPs could be fine-tuned to 4.5±2.0 nm, 5.9±2.5 nm and 6.0±1.5 nm with fruit juices and fruit wastes. For the first time, stable and spherical AuNPs with ultrasmall size of 2.6±1.1nm and uniform distribution were successfully achieved using a fruit extract. UV-visible spectroscopy (UV-vis), transmission electron microscopy (TEM) and high resolution transmission electron microscopy (HRTEM) were used to characterize the morphology and size distribution of AuNPs produced through the green synthesis. The results indicate that AuNPs synthesized in this study are highly stable at room temperature and in general biological medias. More importantly the small and ultrasmall AuNPs were able to be imaged or monitored by dark-field optical microscopy which allows to monitor AuNPs in a live, single cell and this holds great promise in biomedical applications.

### Biography

Ju Chou is currently an Associate Professor in the Department of Chemistry and Physics at Florida Gulf Coast University. Dr. Chou received her Ph.D. in chemistry from Chinese Academy of Science, Changchun, China in 1995. After that, Dr. Chou worked as a postdoctoral fellow in RIKEN Research Institute in Japan for a year and then came to the United States as a visiting research scholar working at University of California-Irvine and later at University of California-Santa Barbara. Dr. Chou's research areas include bio-electrochemistry of proteins, bioaccumulation of trace elements in tissues, synthesis and characterization of nanomaterials. Dr. Chou's recent research interests also include green synthesis of gold nanoparticles and environmental analysis of toxic metals in water and human hair. She is also collaborating with biology professors on the application of gold nanoparticles. This research focuses studying toxicity, biocompatibility and transport of gold nanoparticles in membranes and cancer cells.

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