

Synthesis and Purification of Novel Hydrophobic Gold Quantum Clusters

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In recent years, people pay more and more attention to environmental protection issues. Therefore, the application of heavy metal elements as the main synthetic material has faced challenges. For example, in the past, quantum dot was used to make light emitting diode, biological imaging, cell tracking, molecular diagnostics, and so on. Many scientists began to care more about environmentally friendly materials, which made of metallic nanoparticles and started to conduct related research on its development, such as silver quantum dots or fluorescent gold quantum clusters synthesized using gold as a precursor. They are gradually replacing quantum dot materials that are potentially harmful to the biological environment.

In this study, gold quantum clusters with blue fluorescence were synthesized in an easy way. The whole process of gold quantum cluster synthesis is all performed in a hydrophobic environment, and the organic ligands used to enhance its fluorescent properties are Trioctylphosphane (TOP) and Triphenylphosphine (TPP). In such a simple method for synthesizing clusters, in order to increase the quantum yield of the clusters, many reducing agents are added during the process, but it is difficult to separate from the product, so the final purification process of the experiment is a very important part. In this experiment, we discuss the advantages and disadvantages of four different purification methods, including concentration purification under reduced pressure, ultra-high-speed centrifugation, solvent purification with different polarities, and thin layer chromatography (TLC), and compare the obtained results.

Based on its high quantum yield, the gold quantum cluster is applicable for biological imaging and light-emitting diodes. It will development on biomedical materials and related applications in the future. We expect that the synthesis of new fluorescent cluster materials will bring more benefits to the application of future technology.

Biography

My name is Chih-chueh Lu. I am a master student in the department of Biomedical Engineering of Chung Yuan Christian University in Taiwan. I joined the Nano Biomedical Materials and Gold Medical Materials Lab, and the guiding professor is Dr. Cheng-an J. Lin. At present, I'm doing the research on the characterstics and applications of gold nanoclusters. What interests me most is its optical characteristics. Many new instruments and experimental methods used during the experiment also made me feel novel. In my research career, I will always hold this feeling to discover more new knowledge, hoping that it will be helpful for related fields in the future.

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Session name/ number: 17th Nanotechnology and Nanomedicine Congress/
Category: Poster presentation