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Ultrasound-Aided Monolayer Assembly of Spherical Silica Nanobeads

윤상희, 윤서영, 이진석*

숙명여자대학교 화학과

In modern science and technology, the organization of building blocks, such as spherical particles and zeolite, is important to form a nanostructure. So, it is essential to develop methods for organizing them into large scale for many precise applications. Up to now, reflux and stirring is widely used method for organization of colloidal particles. However, because this method is hard to organize building block with high coverage and uniform orientation, it is necessary to research another method. In this work, we synthesized spherical silica particles using Stöber method and organized them on the glass which is coated with 3-chloropropyltrimethoxysilane (CP-TMS) and polyethyleneimine (PEI) using Sonication method. Although spherical silica particles are difficult to attach on the glass due to their small attachment site, we improved this problem by coating PEI. We introduced two mode of reaction promotion, sonication (SO) and sonication with stacking between the bare glass (SS), and investigated degree of coverage (DOC) and degree of close packing (DCP).

Keywords: monolayer assembly, sonication

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pH Dependent Size and Size Distribution of Gold Nanoparticles

Aeyeon Kang, Dae Keun Park, Sang Hwa Hyun, Wan Soo Yun*

Department of Chemistry, Sungkyunkwan University (SKKU), Suwon, Korea

In the citrate reduction method of gold nanoparticle (AuNP) synthesis, pH of the reaction mixture can have a considerable impact on the size and size distribution of AuNPs. In this work, effects of pH variation upon the size and its distribution were examined systematically. As the initial pH was change from 5.5 to 10.5, it showed an optimal pH around 7.5. At this pH, both of the size and the size distribution showed their minimum values, which was verified by transmission electron microscopy and UV-vis spectroscopy. This occurrence of optimal pH was discussed with the results of in situ monitoring pH during the reaction of AuNP synthesis.

Keywords: gold nanoparticle, pH, size distribution