Synthesis of Monodisperse Silica Nanoparticles by Two-Phase Method

전태윤[1,2], 임채호[1,2], 조수정[1,2], 양승만[1,2,*]
[1]한국과학기술원 생명화학공학과; [2]광자유체집적소자연구단
(smyang@kaist.ac.kr*)

Monodisperse silica nanoparticles have been used in many fields because of their various applications. Silica nanoparticles with narrow size distribution can be used as a building block to make nanostructures such as colloidal photonic crystals and their regular arrays have advantages in phase lithography due to their unique light interference pattern. However, conventional silica nanoparticles synthesis method (the so-called Stöber method) has some limitations in size control and containing high monodispersity. In this study, we report high quality silica synthesis method which uses oil-water interface for slow releasing of silica precursor, TEOS (Tetraethylorthosilicate), from oil to water phase and this leads to small size (less than 50 nm) monodisperse silica particles. And by using small size particles as seed, we can regrowth silica nanoparticles range from 100 to 1000 nm through slow injection of TEOS using syringe pump. To control the size of silica nanoparticles more exactly, we investigate the effect of TEOS concentration, NH4OH catalyst concentration on the size of silica nanoparticles. In addition, we characterize the optical properties of colloidal photonic crystals composed of silica nanoparticles we prepared.