

Fabrication of Uniform Sized Titania Hollow Spheres Using Microfluidic Chips

김세훈^{1,2}, 은태희^{1,2}, 양승만^{1,2,*}

¹한국과학기술원; ²광자유체집적소자연구단

(smyang@kaist.ac.kr*)

Hollow spheres of inorganic materials have been highlighted because of their potential applications such as photocatalysts, filler, photonic crystals and controlled delivery vehicles. Commonly, hollow spheres can be fabricated by layer-by-layer deposition of inorganic materials using hard templates or direct synthesis of inorganic shells around emulsion droplets. The emulsion method, compared to hard template method, is more efficient to produce inorganic shells with desired thickness but hard to produce uniform sized spheres. In here, we fabricated uniform sized titania shells with massive amounts in a short time by forming emulsion droplets using microfluidic chips. Monodispersed oil droplets in water were formed by injecting two kinds of solutions into glass chips by syringe pumps; oil phases including titanium precursors and aqueous phase containing surfactants. The key point is to substitute titanium alkoxide with long chain organic acids to reduce the hydrolysis rate. The size and shell thickness can be controlled by changing inside diameter of capillary and varying the concentration of titanium precursors.