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Author I-Han Chen
Author's Email Address No Public.
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Abstract
Hollow magnetic-silica sphere have been attracted more attention because of there potential applications for electrical, catalytic, mechanical, biological, microwave absorption, even optical material. In this article, the functional polymer poly(MMA-co-MAA) latex(450nm) was acted the core template. First of all, the magnetic layer was obtained by chemical co-precipitation and then the SiO2 layer was synthetized by sol-gel method. Additional after calcinations at 600℃ for 5h the hollow cobalt ferrite-SiO2 spheres were formed. The hollow spheres structure could be confirmed by scanning electron microscope (SEM) and transmission electron microscope (TEM). Form EM investigation indicated that the morphology of the PMMA/CoFe2O4/SiO2 core-shell spheres and hollow magnetic silica (CoFe2O4/SiO2) sphere was fairly uniform and the thickness of the hollow spheres was about 50nm. TGA analysis could be indicated that the content of cobalt ferrite was 27wt% and SiO2 was 10 wt% in the composite. Additionally, the magnetic propertie was distinguished from vibrating sample magnetometer (VSM). By the way after calcinations the saturation magnetization(Ms) of CoFe2O4/ SiO2 hollow spheres is about 16.3 emu/g. And the hysteresis loop instructed that the CoFe2O4/ SiO2 hollow sphere was superparamagnetic property. Furthermore, through sol–gel method based on hydrolysis and condensation the complete silica network formed, which in turn hinders the growth of CoFe2O4 nanoparticles and results in an effective refinement of CoFe2O4 particles. After that the silanol surface can be modified with various coupling agents to covalently attach specific bioligands to the surfaces of the hollow magnetic spheres. The hollow magnetic sphere perhaps has much potential on bio-separation application.
Advisory Committee Cheng-Chien Wang - advisor

Chun-Rong Lin - advisor

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