

Title Chemistry for Nano, and Nano for Medicine&Energy

Speaker Prof. Taeghwan Hyeon

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Date & Time Friday, April 4, 2014 4:00 p.m.

Place I²CNER Hall, Ito campus, Kyushu University

Abstract

Recently our group has been focused on medical applications of various uniform-sized nanoparticles. For example, using 3 nm-sized iron oxide nanoparticles, new non-toxic MRI contrast agent was realized for high resolution MRI of blood vessels down to 0.2 mm, which can be potentially applied to early diagnosis of cancers, stroke, and cardiovascular diseases. We demonstrated that ceria nanoparticles could protect against ischemic stroke in an *in vivo* animal model. In animal trials, intravenously administered ceria nanoparticles considerably reduced the stroke volume and nerve damage. We reported the first successful demonstration of high-resolution *in vivo* three-photon imaging using biocompatible and bright Mn²⁺ doped ZnS nanocrystals. Tumor vascular lining could be visualized with a resolution as small as 2 micrometer, which can be eventually applied to real-time monitoring of tumors during cancer surgery.

We reported the large-scale synthesis of magnetite nanocrystals imbedded in a carbon matrix and hollow iron oxide nanoparticles. These iron oxide-based nanomaterials exhibited very high specific capacity and good cyclability. We demonstrate galvanic replacement reactions in metal oxide nanocrystals. When Mn₃O₄ nanocrystals were reacted with iron(II) perchlorate, hollow box-shaped nanocrystals of Mn₃O₄/γ-Fe₂O₃ (“nanoboxes”) were produced. Because of their non-equilibrium compositions and hollow structures, these nanoboxes exhibited good performance as anode materials for lithium ion batteries.

About the Speaker

Prof. Taeghwan Hyeon received his B. S. (1987) and M. S. (1989) in Chemistry from Seoul National University (SNU), Korea. He obtained his Ph.D. in Chemistry from U. Illinois (1996). Since he joined the faculty of the School of Chemical and Biological Engineering of SNU in September 1997, he has been focused on the **synthesis and applications of uniform-sized nanoparticles and nanoporous materials**, and published > 200 papers in prominent international journals. In 2012, he was appointed as a Director of Center for Nanoparticle Research of Institute for Basic Science (IBS). He received many awards including the **Korean Young Scientist Award** (2002), **DuPont Sci&Tech Award** (2005), **POSCO-T. J. Park Award** (2008), and **Hoam Prize** (2012, Samsung Hoam Foundation). Since 2010, he has served as an *Associate Editor of J. Am. Chem. Soc.* He has been serving as editorial (advisory) board members of *Advanced Materials*, *Nanoscale*, *Nano Today*, and *Small*.

Host: Professor Atsushi Takahara

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