

Postdoctoral Researcher
Department of Chemistry and Biochemistry
Florida State University
Tallahassee, FL 32306-4390, USA

Email: hbna@fsu.edu

EDUCATION

- 2001.3-2008.2 **Ph.D. Chemical Engineering, Seoul National University**
Thesis Title: [Water-Dispersible Metal Oxide Nanoparticles for MRI Contrast Agents](#)
Thesis Advisor: Taeghwan Hyeon
- 1997.3-2001.2 **B.S. Chemical Engineering, Seoul National University**

RESEARCH AND PROFESSIONAL EXPERIENCE

- 2009.11-Present Postdoctoral Researcher (Supervisor: Prof. Hedi Mattoussi),
Department of Chemistry and Biochemistry,
Florida State University, USA
- 2008.3-2009.10 Postdoctoral Researcher (Supervisor: Prof. Taeghwan Hyeon),
National Creative Research Initiative Center for Oxide Nanocrystalline Materials,
School of Chemical and Biological Engineering,
Seoul National University, Korea
- 2004.5-2004.11 Visiting Researcher (Supervisor: Dr. Jungbae Kim),
Environmental Molecular Sciences Laboratory
Pacific Northwest National Laboratory, USA

PUBLICATIONS

- [27] Hedi Mattoussi, Goutam Palui, **Hyon Bin Na**, “*Luminescent quantum dots as platforms for probing in vitro and in vivo biological processes*” *Advanced Drug Delivery Reviews*, **2011**, *in press*.
- [26] Byung Hyo Kim, Nohyun Lee, Hyoungsu Kim, Kwangjin An, Yong Il Park, Yoonseok Choi, Kwangsoo Shin, Youjin Lee, Soon Gu Kwon, **Hyon Bin Na**, Je-Geun Park, Tae-Young Ahn, Young-Woon Kim, Woo Kyung Moon, Seung Hong Choi, and Taeghwan Hyeon, “*Large-Scale Synthesis of Uniform and Extremely Small-Sized Iron Oxide Nanoparticles for High-Resolution T1 Magnetic Resonance Imaging Contrast Agents*” *Journal of the American Chemical Society*, **2011**, *133*, 12624–12631.
- [25] **Hyon Bin Na** and Taeghwan Hyeon, “*MRI contrast agents based on inorganic nanoparticles*” *Nanoplatform-Based Molecular Imaging Edited by Xiaoyuan Chen*, **2011**, 279-308. (Book Chapter)

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- [24] Yunxian Piao, Zongwen Jin, Dohoon Lee, Hye-Jin Lee, **Hyon Bin Na**, Taeghwan Hyeon, Min-Kyu Oh, Jungbae Kim, and Hak-Sung Kim, “Sensitive and high-fidelity electrochemical immunoassay using carbon nanotubes coated with enzymes and magnetic nanoparticles” *Biosensors and Bioelectronics*, **2011**, *26*, 3192-3199.
- [23] Byoungsoo Lee, Daniel Lopez-Ferrer, Byoung Chan Kim, **Hyon Bin Na**, Yong Il Park, Karl K. Weitz, Marvin G. Warner, Taeghwan Hyeon, Sang-Won Lee, Richard D. Smith, Jungbae Kim, “Rapid and efficient protein digestion using trypsin-coated magnetic nanoparticles under pressure cycles” *Proteomics (Issue Cover Article)*, **2011**, *11*, 309-308.
- [22] Jong Young Choi, Su Hee Lee, **Hyon Bin Na**, Kwangjin An, Taeghwan Hyeon and Tae Seok Seo, “In vitro cytotoxicity screening of water-dispersible metal oxide nanoparticles in human cell lines” *Bioprocess and Biosystems Engineering*, **2010**, *33*, 21-30.
- [21] Sang-Mok Lee, Li Hua Jin, Jae Hyun Kim, Sung Ok Han, **Hyon Bin Na**, Taeghwan Hyeon, Yoon-Mo Koo, Jungbae Kim, Jung-Heon Lee, “ β -Glucosidase coating on polymer nanofibers for improved cellulosic ethanol production”, *Bioprocess and Biosystems Engineering*, **2010**, *33*, 141-147.
- [20] Yong Il Park, Jeong Hyun Kim, Kang Taek Lee, Ki-Seok Jeon, **Hyon Bin Na**, Jung Ho Yu, Hyung Min Kim, Nohyun Lee, Seung Hong Choi, Sung-Il Baik, Hyungsu Kim, Seung Pyo Park, Beom-Jin Park, Young Woon Kim, Sung Ho Lee, Soo-Young Yoon, In Chan Song, Woo Kyung Moon, Yung Doug Suh, Taeghwan Hyeon, “Nonblinking and Nonbleaching Upconverting Nanoparticles as an Optical Imaging Nanoprobe and T1 Magnetic Resonance Imaging Contrast Agent” *Advanced Materials*, **2009**, *21*, 4467-4471.
- [19] **Jinwoo Lee**, † **Hyon Bin Na**, † Byoung Chan Kim, Jin Hyung Lee, Byoungsoo Lee, Ja Hun Kwak, Yosun Hwang, Je-Geun Park, Man Bock Gu, Jaeyun Kim, Jin Joo, Chae-Ho Shin, Jay W. Grate, Taeghwan Hyeon, Jungbae Kim, († **Equally contributed**) “Magnetically-separable and highly-stable enzyme system based on crosslinked enzyme aggregates shipped in magnetite-coated mesoporous silica” *Journal of Materials Chemistry*, **2009**, *19*, 7864-7870.
- [18] **Hyon Bin Na**, Taeghwan Hyeon, “Nanostructured T1 MRI contrast agents” *Journal of Materials Chemistry*, **2009**, *19*, 6267-6273.
- [17] Taekyung Yu, Jaewon Moon, Jinkyung Park, Yong Il Park, **Hyon Bin Na**, Byung Hyo Kim, In Chan Song, Woo Kyung Moon and Taeghwan Hyeon, “In vitro cytotoxicity screening of water-dispersible metal oxide nanoparticles in human cell lines” *Chemistry of Materials*, **2009**, *21*, 2272-2279.

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- [16] **Hyon Bin Na**, In Chan Song, Taeghwan Hyeon, “*Inorganic Nanoparticles for MRI Contrast Agents*”, *Advanced Materials (Invited Review Article)*, **2009**, *21*, 2133-2148.
- [15] Kwangjin An, Soon Gu Kwon, Mihyun Park, **Hyon Bin Na**, Sung-Il Baik, Jung Ho Yu, Dokyoon Kim, Jae Sung Son, Young Woon Kim, In Chan Song, Woo Kyung Moon, Hyun Min Park, Taeghwan Hyeon, “*Synthesis of Uniform Hollow Oxide Nanoparticles through Nanoscale Acid Etching*”, *Nano Letters*, **2008**, *8*, 4252-4258.
- [14] Assaf A. Gilad, Piotr Walczak, Michael T. McMahon, **Hyon Bin Na**, Jung Hee Lee, Kwangjin An, Taeghwan Hyeon, Peter C. M. van Zijl, Jeff W. M. Bulte, “*MR tracking of transplanted cells with "positive contrast" using manganese oxide nanoparticles*”, *Magnetic Resonance in Medicine*, **2008**, *60*, 1-7.
- [13] Sang-Hyun Choi, **Hyon Bin Na**, Yong Il Park, Kwangjin An, Soon Gu Kwon, Youngjin Jang, Mi-hyun Park, Jaewon Moon, Jae Sung Son, In Chan Song, Woo Kyung Moon, Taeghwan Hyeon, “*Simple and Generalized Synthesis of Oxide-Metal Heterostructured Nanoparticles and their Applications in Multimodal Biomedical Probes*”, *Journal of the American Chemical Society*, **2008**, *130*, 15573-15580.
- [12] Moon Il Kim, Jungbae Kim, Jinwoo Lee, Sujeong Shin, **Hyon Bin Na**, Taeghwan Hyeon, Hyun Gyu Park, Ho Nam Chang, “*One-dimensional crosslinked enzyme aggregates in SBA-15: Superior catalytic behavior to conventional enzyme immobilization*”, *Microporous and Mesoporous Materials*, **2008**, *111*, 18-23.
- [11] Yuanzhe Piao, Jaeyun Kim, **Hyon Bin Na**, Dokyoon Kim, Ji Seon Baek, Mi Kyeong Ko, Jung Hee Lee, Mohammadreza Shokouhimehr, Taeghwan Hyeon, “*Wrap-bake-peel process for nanostructural transformation from β -FeOOH nanorods to biocompatible iron oxide nanocapsules*”, *Nature Materials*, **2008**, *7*, 242-247.
- [10] Jinwoo Lee, Youjin Lee, Jong Kyu Youn, **Hyon Bin Na**, Taekyung Yu, Hwan Kim, Sang-Mok Lee, Yoon-Mo Koo, Ja Hun Kwak, Hyun Gyu Park, Ho Nam Chang, Misun Hwang, Je-Geun Park, Jungbae Kim, Taeghwan Hyeon, “*Simple synthesis of functionalized superparamagnetic magnetite/silica core/shell nanoparticles and their application as magnetically-separable high-performance biocatalysts*”, *Small*, **2008**, *4*, 143-152.
- [9] **Hyon Bin Na**, In Su Lee, Heonjin Seo, Yong Il Park, Jung Hee Lee, Sang-Wook Kim, Taeghwan Hyeon, “*Versatile PEG-derivatized phosphine oxide ligands for water-dispersible metal oxide nanocrystals*”, *Chemical Communications*, **2007**, 5167-5169.
- [8] **Hyon Bin Na**, Jung Hee Lee, Kwangjin An, Yong Il Park, Mihyun Park, In Su Lee, Do-Hyun Nam, Sung Tae Kim, Seung-Hoon Kim, Sang-Wook Kim, Keun-Ho Lim, Ki-Soo Kim, Sun-Ok Kim, Taeghwan Hyeon, “*Development of a T1 Contrast Agent for Magnetic Resonance Imaging Using MnO Nanoparticles*”,

Angewandte Chemie International Edition (Issue Cover Article), **2007**, *45*, 5397-5401.

- [7] Moon Il Kim, Jungbae Kim, Jinwoo Lee, Hongfei Jia, **Hyon Bin Na**, Jong Kyu Youn, Ja Hun Kwak, Alice Dohnalkova, Jay W. Grate, Ping Wang, Taeghwan Hyeon, Hyun Gyu Park, Ho Nam Chang, “*Crosslinked enzyme aggregates in hierarchically-ordered mesoporous silica: A simple and effective method for enzyme stabilization*”, *Biotechnology and Bioengineering*, **2007**, *96*, 210-218.
- [6] Jungbae Kim, Jinwoo Lee, **Hyon Bin Na**, Byoung Chan Kim, Jong Kyu Youn, Ja Hun Kwak, Karam Moon, Eunwoong Lee, Jaeyun Kim, Jongnam Park, Alice Dohnalkova, Hyun Gyu Park, Man Bock Gu, Ho Nam Chang, Jay W. Grate, Taeghwan Hyeon, “*A Magnetically Separable, Highly Stable Enzyme System Based on Nanocomposites of Enzymes and Magnetic Nanoparticles Shipped in Hierarchically Ordered, Mesocellular, Mesoporous Silica*”, *Small*, **2005**, *1*, 1203-1207.
- [5] Dohoon Lee, Jinwoo Lee, Jungbae Kim, Jaeyun Kim, **Hyon Bin Na**, Bokie Kim, Chae-Ho Shin, Ja Hun Kwak, Alice Dohnalkova, Jay W. Grate, Taeghwan Hyeon, Hak-Sung Kim, “*Simple Fabrication of a Highly Sensitive and Fast Glucose Biosensor Using Enzymes Immobilized in Mesocellular Carbon Foam*”, *Advanced Materials*, **2005**, *17*, 2828-2833.
- [4] Seung Uk Son, Youngjin Jang, Jongnam Park, **Hyon Bin Na**, Hyun Min Park, Hyung Joong Yun, Jouhahn Lee, Taeghwan Hyeon, “*Designed Synthesis of Atom-Economical Pd/Ni Bimetallic Nanoparticle-Based Catalysts for Sonogashira Coupling Reactions*”, *Journal of the American Chemical Society*, **2004**, *126*, 5026-5027.
- [3] Jin Joo, **Hyon Bin Na**, Taekyung Yu, Jung Ho Yu, Young Woon Kim, Fanxin Wu, Jin Z. Zhang, Taeghwan Hyeon, “*Generalized and Facile Synthesis of Semiconducting Metal Sulfide Nanocrystals*”, *Journal of the American Chemical Society*, **2003**, *16*, 11100-11105.
- [2] Minsuk Kim, Kwonnam Sohn, **Hyon Bin Na**, Taeghwan Hyeon, “*Synthesis of Nanorattles Composed of Gold Nanoparticles Encapsulated in Mesoporous Carbon and Polymer Shells*”, *Nano Letters*, **2002**, *2*, 1383-1387.
- [1] Taeghwan Hyeon, Su Seong Lee, Jongnam Park, Yunhee Chung, **Hyon Bin Na**, “*Synthesis of Highly Crystalline and Monodisperse Maghemite Nanocrystallites without a Size-Selection Process*”, *Journal of the American Chemical Society*, **2001**, *123*, 12798-12801.

PATENTS

- [2] Taeghwan Hyeon, Sang-Wook Kim, **Hyon Bin Na**, “Biocompatible suspension stabilizer for dispersing inorganic nanoparticles into aqueous solution” WO 2009051392 (A3), US 2010228045 (A1), KR 20090038337 (A), JP 2011501751 (T), EP 2205613 (A2)

- [1] Taeghwan Hyeon, **Hyon Bin Na**, Kwangjin An, “MRI T1 Contrasting Agent comprising Manganese Oxide Nanoparticle”, Korean Patent Application No. 10-2007-0077029 (2007.07.31)

PRESENTATIONS

- International** **Hyon Bin Na**, Kwangjin An, Yong Il Park, Taeghwan Hyeon, “Water-Dispersible Manganese Oxide and Iron Oxide Nanoparticles for MRI Contrast Agents”, Material Research Society (MRS) 2008 Fall Meeting, MRS, Hynes Convention Center, Boston, MA, USA, Dec. 1-5, 2008 (Oral Session)
- Hyon Bin Na**, Yong Il Park, Kwangjin An, Taeghwan Hyeon, “Manganese Oxide (MnO) Nanocrystals as a T1 MRI contrast agent” NanoBio-Seoul 2008, Yonsei University, Seoul, Korea, Oct. 30-31, 2008. (Poster Session)
- Taeghwan Hyeon, Jung Hee Lee, **Hyon Bin Na**, Kwangjin An, Yong Il Park, In Su Lee, Sung Tae Kim, Keun-Ho Lim, “Manganese Oxide (MnO) Nanoparticles Enhanced MRI of Mouse Body and Metastatic Brain Tumor” AMI/SMI Joint Molecular Imaging Conference 2007, Rhode Island Convention Center, Providence, RI, USA, Sep. 7-11, 2007. (Poster Session)
- Hyon Bin Na**, Jung Hee Lee, Kwangjun An, In Su Lee, Yong Il Park, Sung Tae Kim, Sun-Ok. Kim, Taeghwan Hyeon, “Manganese Oxide (MnO) Nanoparticles As a New T1 Contrast Agent for MRI”, Joint Annual Meeting ISMRM-ESMRMB, Berlin, German, May 19-25, 2007. (Poster Session)
- Jung Hee Lee, **Hyon Bin Na**, Kwangjin An, In Su Lee, Yong Il Park, Jongnam Park, Sung Tae Kim, Seung-Hoon Kim, Keun-Ho Lim, Taeghwan Hyeon, Joint Annual Meeting ISMRM-ESMRMB, Berlin, German, May 19-25, 2007. (Poster Session)
- Taeghwan Hyeon, Jaeyun Kim, **Hyon Bin Na**, Ji Eun Lee, Yong Il Park, Nohyun Lee, “Multifunctional Nanobiomedical Platforms based on Nanoparticles and Nanoporous Materials” Materials Research Society (MRS) 2005 Spring Meeting, San Francisco, CA, USA, April 9-13, 2007.
- Taeghwan Hyeon, Jongnam Park, Kwangjin An, Jaeyun Kim, **Hyon Bin Na**, “Large-scale Synthesis of Monodisperse Nanocrystals of Ferrites and Oxides and their Biomedical Applications”, Scientific and Clinical Applications of Magnetic Carriers 6th International Conference, Krems, Austria, May 17-20, 2006.
- Domestic** **Hyon Bin Na**, Sang-Wook Kim, Taeghwan Hyeon, “Water-Dispersible Metal Oxide Nanoparticles by PEG-derivatized Phosphine Oxide Ligands” 37th Korean Society of Industrial and Engineering Chemistry Spring Meeting, Hanyang University, Ansan, Korea, May 9-10, 2008.

Hyon Bin Na, Kwangjin An, Taeghwan Hyeon, "Manganese Oxide (MnO) Nanocrystals as a new MRI T1 contrast agent", 100th Korean Chemical Society Fall Meeting, EXCO, Daegu, Korea, Oct. 18-19, 2007.

Taeghwan Hyeon, Kwangjun An, **Hyon Bin Na**, Jaeyun Kim, "Synthesis and Biomedical Applications of Uniform-sized Nanoparticles and Nanoporous Materials", 99th Korean Chemical Society Spring Meeting, COEX, Seoul, Korea, May 23-24, 2007.

TEACHING EXPERIENCES

2001.3-2001.7 Teaching Assistant, Organic-Inorganic Synthesis Experiment
2001.9-2002.12 Teaching Assistant, Organic-Inorganic Synthesis Experiment

RESEARCH EXPERTISE

Synthesis and Modification of Nanocrystals for Biological Applications

Solution-Phase Synthesis of Inorganic Nanocrystals (Metal oxides, metal, semiconductors)

Modification and Functionalization of Inorganic Nanocrystals

Synthesis of Stabilizing Ligands and Matrixes for Biocompatible Nanocrystals (Polymer, Silica)

Conjugation of Bioactive Materials with Nanoparticles (Antibody, Peptide, Protein, dye)

Understanding and Preliminary Interpretation on Bioimaging

Magnetic Resonance Imaging Assisted by Metal Oxide Nanocrystals

Fluorescent Imaging using Quantum Dots (*in vitro*)

Synthesis of Nanostructure-Enzyme Hybrid Materials

Synthesis of Single Enzyme Nanoparticles

Incorporation of Enzyme in Nanostructured Materials (Mesoporous Materials, Inorganic Nanocrystals)

Analytical Tools for Characterization of Nanomaterials (Self-Operating)

Transmission Electron Microscope (JEOL JEM-2010)

Powder X-Ray Diffraction (Rigaku D/Max-3C)

Light scattering particle size analyzer (Otsuka electronics ELS-Z)

Pore Analyzer (Micromeritics-ASAP 2000)

Confocal Laser Scanning Microscope (BioRad MRC-1024)

UV-VIS spectroscopy (JASCO V-550)

Fluorescence Spectroscopy (JASCO FP-6500)

FT-Infrared Spectroscopy (Mettler Toledo ReactIR™ 4000 spectrometer)

Organometallics technique: Schlenk Technique, Dry Box Technique
