# COINS Seminar #30

**【Date】2/16/2018（Friday）10 : 30～11 : 45 (Registration Open at 10 : 00)**
**【Venue】Innovation Center of NanoMedicine (iCONM) 3F 3001 Meeting room**
**【Registration】https://www.cis-trans.jp/coins_seminar/**

**Title : Smart Photomedicines Using Multi-Functional Nanomaterials**

Abstract : The recent progress in photonic nanomaterials has contributed greatly to the development of photomedicines with many techniques now in routine clinical use. However, the finite depth of light penetration in tissue is a serious constraint to clinical applications. In this work, we developed implantable light-delivery devices using biodegradable polymers. With this light delivery system, we demonstrated photochemical tissue bonding (PTB) for wound healing with a Rose Bengal (RB) dye, achieving a full thickness (410 mm) wound closure of porcine skin. We also demonstrated the facilitated PTB using upconversion nanoparticle / hyaluronate - rose bengal conjugate (UCNP / HA-RB) complex. The UCNP emitting red and green light in the skin tissue by skin-penetrating near infrared (NIR) laser illumination could activate the RB dye and crosslink the collagen, inducing skin repair and deep tissue wound healing. In addition, we successfully developed cell-integrated poly(ethylene glycol) hydrogels for in vivo optogenetic sensing and therapy. Real-time optical readout of encapsulated heat-shock-protein-coupled fluorescent reporter cells made it possible to measure the nanotoxicity of cadmium-based quantum dots in vivo. Using optogenetic cells producing glucagon-like peptide-1, we performed light-controlled therapy and obtained improved glucose homeostasis in diabetic model mice. Finally, we developed a smart contact lens composed of biosensors, drug delivery systems, and remote power sources for ubiquitous healthcare. Connected with a personal computer for wireless communication, tear glucose level could be measured as a non-invasive alternative to the conventional blood glucose tests. Furthermore, we could successfully demonstrate the controlled pulsatile drug delivery from gold coated reservoirs integrated within the smart contact lens for the treatment of diabetic retinopathy. This presentation will provide the current state-of-the-art smart photomedicines for further biomedical applications.

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<CV>

◆ Education

2001.4~2002.5 Department of Bioengineering, University of Washington (Post-doc)

1993.3~1996.8 Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and

Technology (KAIST, Ph.D.)
1991.3~1993.2 Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST, M.S.)
1987.3~1991.2 Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST, B.S.)
1985.3~1987.2 GyeongNam Science High School, Korea (Completed in 2 years)

◆ Experiences
2015.3~Present Full Professor in the Department of Materials Science and Engineering at POSTECH
2012.3~2015.2 Se-Ah Young Chair Professor at POSTECH
2009.3~2015.2 Associate Professor in the Department of Materials Science and Engineering at POSTECH
2012.1~2013.12 Visiting Associate Professor at the Harvard Medical School
2012.1~2013.12 Visiting Scientist at the Massachusetts General Hospital
2005.7~2009.2 Assistant Professor in the Department of Materials Science and Engineering at POSTECH
2002.6~2005.7 Stage II Research Scientist at the Research Institute of Chugai Pharmaceutical Co., Roche Group
2001.4~2002.5 Postdoctoral Fellow at the University of Washington Engineered Biomaterials
1996.7~2001.3 Senior Research Scientist at LG Chemical and LG Life Sciences Co.
1993.3~1996.8 Teaching/Research Assistant in the Department of Chemical and Biomolecular Engineering at KAIST
1994.7~1994.9 Junior Research Specialist at the University of California, Irvine

<Honors & Awards>
2017 Award for Promotion of Health Science & Technology
/Minister of Health & Welfare
2016 POSTECHIAN Research Award/POSTECH
2016 Midcareer Research Award/Polymer Society of Korea
2015 The Best Patent Award of KINPEX/Korean President
2015 Samsung Human Tech Award/Samsung Group
2014 Technology Transfer Reward (100 M Won)/Shinpoong Pharm. Co.
2013 The Best Academy-Industry Collaboration Award/Minister of Education
2013 The Best Technology Award/Korean Society of Biotech. & Bioeng.
2012 Award for Promotion of Science and Technology/Gyeongbuk Province Governor
2012 POSTECH Young Chair Professorship/SeAh Steel Co.
2011 LG Yeonam Foundation Research Fellowship/LG Yeonam Foundation
2011 BioMed Connect Center Consultant/Samsung Hospital
2009 Outstanding Research Award/Hoffman-La Roche
2008 Biomaterial Consultant/Johnson & Johnson
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