

# *School Seminar (2015-29)*

## *School of Materials Science & Engineering*

# “Cell-based bio-actuator walking and working by self- folding assembly”

Prof. Jeong, Jae Hyun

(Dept. of Chemical Engineering, Soongsil Univ.)

2015. 11. 19. (Thur.) 16:00

APRI 1F, Auditorium Hall

## Cell-based bio-actuator walking and working by self-folding assembly

Jae Hyun Jeong, Ph. D

Assistant Professor, Department of Chemical Engineering, Soongsil University

Significant progress in developing cell-based biohybrid actuators has increasingly been studied. For example, contractile stresses and forces of single cells and cell sheets of cardiomyocytes and skeletal myotubes cultured on micro-cantilevers have been measured. In this study, the integrated cell-based bio-actuator was fabricated by DLP 3D printer and subsequently filling the cell-matrix composed of collagen, Matrigel and Myoblasts. In parallel, we prepared a hydrogel actuator consisting of two different layers with significantly different stiffness and capacities to uptake water in response of the environments. Next, electrical stimulation triggered contraction of cells in the muscle band and movement of the integrated cell-based actuator. This cell-based bioactuator system could be further developed as a integrated cellular machines and systems to provide drug screening, programmable tissue engineering, and biomimetic machine design.

This presentation covers the latest works in self-assembly with bio-inspired molecules for neovascularization and further in vivo clinical applications. In addition, the study of a 'living' microvascular stamp that releases multiple angiogenic factors and subsequently creates neovessels with the same pattern as that engraved in the stamp will be discussed also in this talk. The design principles established to assemble the above introduced nano- and microsystems would be useful in designing a broad array of bio-inspired materials to create 'on demand' micro-vascular networks in an organized fashion.

### References:

Journal of the American chemical Society (2013) 135, 24, 8770

Advanced Materials (2013) 24, 58

Tissue Engineering, Part A (2013) 11 & 12, 1275

Jae Hyun Jeong

## Jae Hyun Jeong

Assistant Professor, Chemical Engineering, Soongsil University

Address: Faculty Room 315, 369, Sangdo-Ro, Dongjak-Gu, Seoul, 156-743 South Korea

E-mail: [nfejhh@ssu.ac.kr](mailto:nfejhh@ssu.ac.kr)

Tel: +82-2-828-7043 (Office)

### Education

---

- 2003 Mar – 2007 Feb      **Ph.D.** Chemical & Biomolecular Eng., **KAIST**, Daejeon, Korea  
Thesis “Self-Assembled nanoparticle of poly(amino acid)s and their application to cancer therapy.” (Advisor: Prof. *Jong-Duk Kim*)
- 2001 Mar – 2003 Feb      **M.S.** Chemical & Biomolecular Eng., **KAIST**, Daejeon, Korea  
Thesis “Self-aggregation of amphiphilic poly(asparagine) grafted with poly(caprolactone) in an aqueous solution.” (Advisor: Prof. *Jong-Duk Kim*)
- 1997 Mar – 2001 Feb      **B.S.** Chemical Eng., **Yonsei University**, Seoul, Korea

### Professional Experience

---

- 2013 Sep –                      **Assistant Professor**  
Chemical Engineering, Soongsil University, South Korea
- 2013 Mar – 2013 Aug        **Professor for Special Appointment**  
Chemistry and Nano Sciences, Ewha Womans University, South Korea
- 2008 Oct – 2013 Feb        **Post-Doctoral Research Associate Fellow**  
Chemical & Biomolecular Eng. (Advisor, Prof. *Hyunjoon Kong*)  
University of Illinois at Urbana-Champaign (**UIUC**), Illinois, USA
- 2007 Jan – 2008 Oct        **Senior Researcher**  
Petrochemicals & Polymers R&D, LG Chem, Ltd./ Research Park, South Korea
- 2003 Jul – 2003 Dec        **Research Scholar** (Advisor, Prof. *Kinam Park*)  
Pharmaceutics & Biomedical Eng., Akina Inc. & Purdue Univ. USA
- 2001 Mar – 2007 Feb        **Research & Teaching Assistant** (Advisor, Prof. *Jong-Duk Kim*)  
Chemical & Biomolecular Eng., **KAIST**, South Korea