Name: Aya Mizutani Akimoto

Position: Lecturer, Department of Materials Engineering,
School of Engineering, The University of Tokyo

Lecture title: Development of novel functionalities in thermo-responsive hydrogel

Education:
2005-2010: Graduate School of Pharmacy, Keio University, Japan.
Earned a Ph.D. degree in Pharmaceutical Sciences,
Research topic: Development of thermo-responsive surfaces for cell culture and bio-separation systems

2001-2005: Department of Pharmacy, Kyoritsu University of Pharmacy, Japan.

*2004-2010: Research student, Institute of Advanced Biomedical Engineering and Science, Tokyo Women's Medical University, Japan.

Working Experience
2015-: Lecturer, Department of Materials Engineering, The University of Tokyo, Japan.
2013-2015: Research Associate, Department of Materials Engineering, The University of Tokyo, Japan.
2012-2013: Project Research Associate, Department of Materials Engineering, The University of Tokyo, Japan.
Research topics:
1. Design of smart polymer materials
2. Hydrogels for biomolecule / cell manipulation
3. Polymer brushes for medical devices

2010-2012: Special Postdoctoral Researcher, Bioengineering Laboratory, RIKEN, Japan.

Research topic: Design of Cysteine responsive surfaces for in vitro gene introduction

Research fields: Biomaterials, polymer brushes, hydrogels, regenerative medicine, bio-analytical chemistry, mechanobiology.

Abstracts:

In the past couple of decades, functional polymer hydrogels have been intensively investigated in biotechnology research area. Thermoresponsive poly(*N*-isopropylacrylamide) (PNIPAAm) hydrogel which shows phase transition behavior is one of these hydrogels and has been studied by many researchers. PNIPAAm exhibits thermoresponsive coil-globule transition across its lower critical solution temperature (LCST) at 32 ˚C in aqueous solution [1]. Its structural change can be explained by the reversible hydration/dehydration property of its isopropyl side chains. The hydration allows PNIPAAm to expand its chains, while the dehydrating allows it to aggregate. Thus, when PNIPAAm was cross-linked, the hydrogel expresses reversible swelling and shrinking behaviors across the intrinsic temperature [2]. Using this unique property, PNIPAAm gels have produced many valuable biotechnologies such as drug delivery careers and tissue engineering scaffolds [3].

In this seminar, I will talk about our recent progress for development and discovery of novel functionalities in PNIPAAm gels.

[1] Y. H. Bae, T. Okano, S. W. Kim, ***J. Polym. Sci. Part B, Polym. Phys.***, *28*, 923-936 (1990).

[2] T. Tanaka, ***Phys. Rev. Lett.***, *40*, 820-823 (1978).

[3] L. Klouda, A. G. Mikos, ***Eur. J. Pharm. Biopharm.***, *68*, 34-45 (2008).