

International Conference and Exhibition on <u>Conference's</u> Nanotechnology & Nanomedicine

March 12-14, 2012 Omaha Marriott, USA

TITLE

Synthesis of novel biocompatible polymers and their phase transition behavior

Kazuhiro Sato, Shogo Watahiki, Miho Kusakari and Masaru Tanaka

Graduate School of Science and Technology, Yamagata University, Japan

We have reported that poly (2-methoxyethyl acrylate) (PMEA) exhibit biocompatibility¹). Here, we investigated the lower critical solution temperature (LCST) and the water structure of the PMEA analog copolymers, in order to prepare appropriate polymers for drug delivery system (DDS) and control of cell adhesion, growth, differentiation and functions. Homopolymers and copolymers were synthesized by radical polymerization. The polymers were characterized by ¹H NMR and GPC. The LCSTs of polymers were determined by measuring optical transmittance and particle size of 1.0 wt/vol% concentration of aquous solution, phosphate buffred saline (PBS) solution and 0.1 wt/vol% polymer blend aquous solution. The structures of water in hydrated polymers were determined by differential scanning calorimetry (DSC). We found that the LCSTs of homopolymers exhibit between 15 to 68°C. In the case of copolymer (feed composition 1:1 molar ratio), the LCST showed the intermediate values of their homopolymers. The LCSTs and temperature width and sharps of PBS solution was lower than those of aquous solution. The results of phase transition behavior observed in polymer blend, we found that the side chain (end group) of chemical structure was the strongest influence on the LCST. We confirmed that hydrated polymers possessed a unique water structure, intermediate water²) which is observed as cold crystallization of water by DSC. This suggests that these polymers have excellent biocompatibility. These temperature responsive polymers are well suited for applications in medical devices such as DDS and artificial blood vessels.

1) M.Tanaka et al., Biomaterials, 21, 1471-1481 (2000). 2) M.Tanaka et al, J. Biomat. Sci. Polym. Ed. 21, 1849-1863 (2010).

Biography

K. Sato is a Ph D student at Biomaterials Science group, Department of Biochemical Engineering.