

NANOSTRUCTURED FUNCTIONAL MATERIALS BY TAMING RADICALS

MATYJASZEWSKI Krzysztof

Carnegie Mellon University, Center for Macromolecular Engineering, Pittsburgh, PA, USA

Abstract

Many advanced nanostructured functional materials were recently designed and prepared by controlled/living radical polymerization (CRP). More than 100 million tons of polymers are produced annually worldwide by conventional radical polymerization. However, macromolecular engineering is impossible in this process. Copper-based ATRP (atom transfer radical polymerization) catalytic systems with polydentate nitrogen ligands is among most efficient controlled/living radical polymerization systems. Recently, by applying new initiating/catalytic systems, Cu level in ATRP was reduced to a few ppm. ATRP of acrylates, methacrylates, styrenes, acrylamides, acrylonitrile and other vinyl monomers was employed for macromolecular engineering of polymers with precisely controlled molecular weights, low dispersities, designed shape, composition and functionality. Examples of block, graft, star, hyperbranched, gradient and periodic copolymers, molecular brushes and various hybrid materials and bioconjugates prepared with high precision will be presented. These polymers can be used as components of various advanced materials such as health and beauty products, biomedical and electronic materials, coatings, elastomers, adhesives, surfactants, dispersants, lubricants, additives, or sealants. Special emphasis will be on nanostructured multifunctional hybrid materials for application related to environment, energy and catalysis.

LITERATURE

- [1] Matyjaszewski, K.; Gnanou, Y.; Leibler, L., *Macromolecular Engineering*, Wiley-VCH, Weinheim 2007;
- [2] Matyjaszewski, K.; Tsarevsky, N. V. *Nature Chemistry* 2009, 1, 276-288;
- [3] Matyjaszewski, K., *Science*, 2011, 333, 1104;
- [4] Matyjaszewski, K. *Macromolecules* 2012, 45, 4015-4039;
- [5] Matyjaszewski K and Möller M (eds.) *Polymer Science: A Comprehensive Reference*, Amsterdam: Elsevier BV, 2012
- [6] Konkolewicz, D.; Wang, Y.; Zhong, M.; Krys, P.; Isse, A. A.; Gennaro, A.; Matyjaszewski, K., *Macromolecules* 2013, 46, 8749-8772.
- [7] Matyjaszewski, K. *J. Amer. Chem. Soc.* 2014, (<http://dx.doi.org/10.1021/ja408069v>)

Author did not supply full text of the paper/poster.