# Radiation-induced synthesis of nanogels – analysis of the product properties with the use of Gel Permeation Chromatography

Slawomir Kadlubowski[1], Carlo Dessy [2], Beata Rurarz[1], Piotr Ulanski[1], Janusz M. Rosiak[1]

[1]Division of Applied Radiation Chemistry, Institute of Applied Radiation Chemistry, Faculty of Chemistry, Lodz University of Technology, Wroblewskiego 15, 93-590 Lodz, Poland,
Testa Analytical Solutions e.K., Sophienstr. 5, 12203 Berlin, Germany
*e-mail: slawomir.kadlubowski@p.lodz.pl*

Ionizing radiation is particularly useful to synthesize polymer products for medicine. This is due to the fact that the process is fast, requires no additional compounds such as e.g. monomers or initiators, and obtained products can be readily chemically pure. Radiation synthesized nanogels[1] can be brought as an excellent example. These three-dimensional networks, characterized by a small structure size, are non-toxic, biocompatible and permeable to water and small-sized active substances. Nanogels are also highly stable while their size and surface properties can be adjusted by changing the chemical composition and applied dose.

Understanding of sophisticated synthetic processes leading to formation of nanostructures requires proper analytic modalities. A gold standard in the nanogel investigation is light scattering, both static (SLS) and dynamic (DLS). Both these techniques allow obtaining complementary data about the structures dispersed in liquid media (such as water or buffers). However, with emergence of combined techniques, also this field have benefited a lot. Particularly, application of chromatography can improve the analytic possibilities for nanogels. Gel Permeation Chromatography (GPC) gives information not only on the bulk/average properties, but also about the distribution of those properties. In this work we present a deeper analysis of the intramolecular crosslinking process based on analysis of the data obtained with the use of Gel Permeation Chromatography combined with Multiangle Laser Light Scattering and Viscosity detectors.

References:

[1] Kadlubowski, S., Grobelny, J., Olejniczak, W., Cichomski, M., Ulanski, P., Macromolecules 36, 2484-2492 (2003)