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PREPARATION OF BISMUTH COUPLED POLYSACCHARIDE NANOPARTICLES FOR MAGNETIC RESONANCE IMAGING

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Magnetic resonance imaging (MRI) plays a crucial role in the future of diagnosis, understanding of diseases, and developing new effective treatments. Therefore, the aim of our work is to explore new contrast mechanisms and push MRI beyond its limits. In order to do so, we exploit the cross relaxation between ¹H and large quadrupolar nuclei (QN) for contrast agent design. We approached this challenge by incorporating bismuth compounds as a QN into and on the surface of bio-compatible ethylcellulose nanoparticles (NPs). The ethylcellulose NPs were prepared by emulsifying the ethylcellulose/ethylacetate solution in an aqueous solution of polyvinyl alcohol (PVA). The emulsion was ultra-sonicated and the organic solvent was evaporated. The excess of PVA was removed by several centrifugation steps using water at 60°C as the rinsing agent. By doing so, one can produce uniform NPs of spherical shape and sizes of 200–400 nm. The introduction of the bismuth compounds was carried out in two different ways. In the first one, triphenyl bismuth (BiPh₃) was dissolved in the ethylcellulose/ethylacetate solution and emulsified in the aqueous solution of PVA. The NPs were prepared under same conditions as neat ethylcellulose NPs. In the second one, a bismuth complex was covalently attached to the surface of the ethylcellulose NPs by reaction of aryl bismuth amide and the remaining hydroxyl groups. The bismuth coupled NPs were characterized for their size by means of dynamic light scattering and scanning electron microscopy, which was also used to visualize the NPs. The particles were also labeled with a fluorescent dye and visualized with a fluorescence microscope.

Biography

Silvo Hribernik works as a Scientific Associate at the Faculty of Mechanical Engineering, University of Maribor. He finished his Graduation in Eco-Textile Engineering in 2005 and Doctorate in Textile Technology in 2010, both at the Faculty of Mechanical Engineering in Maribor, Slovenia. During this time, he also performed research work as a Visiting Scientist at the National Institute of Chemistry in Ljubljana and at the Fraunhofer Institute for Applied Polymer Research Potsdam, Germany. His main area of research is the development of fibre-based functional materials with implementation of nanotechnology and is comprised of several research interests, including study of materials' structure, synthesis of nano-particles, with special attention to magnetic and conductive particles, study and development of coating and adsorption processes.

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