Magnetic Nanoparticles for Solving Diagnostics - Therapeutic Problems with COVID-19

Adriana Zeleňáková[1, a], Vladimír Zeleňák[2], Pavol Hrubovčák[1], Jaroslava Szűcsová[1], Eva Beňová[2], Ľuboš Nagy[1], Michael Barutiak[1] and Štefan Vilček[3]

[1]*Department of Condensed Matter Physics, Pavol Jozef Šafárik University, Košice, Slovakia,*
[2]*Department of Inorganic Chemistry, Pavol Jozef Šafárik University, Košice, Slovakia*
[3]*Department of Epizootiology and Parasitology, University of Veterinary Medicine and Pharmacy, Komenského 73, 040 01 Kosice, Slovakia*

[a]*Corresponding author: adriana.zelenakova@upjs.sk*

Abstract. In this study, we describe the preparation, design, structural, magnetic and functional properties of magnetic nanoparticle systems for biomedical applications as drug carriers, and magnetic RNA separation. Magnetic separation is one of the most efficient and fastest methods currently used in nucleic acid isolation and is also applied the COVID-19 pandemic. An essential part of this methodology are core-shell magnetic nanoparticles, which are necessary in the first stages of the diagnostic chain, during the separation of biological material. The magnetic nanoparticles will be surface and structurally modified to achieve better separation efficiency. The quality of the prepared nanoparticles will be verified by isolation of viral RNA for detection of RNA viruses by RT-qPCR method. In addition, the lecture includes a view of the COVID-19 pandemic from a therapeutic perspective, when core-shell magnetic nanoparticles will be used as a carrier of a model antiviral drug and the influence of such systems on cell viability and metabolic activity in vitro will be monitored and analyzed in correlation with magnetic properties.

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