Nanotechnology for COVID-19: From Diagnosis, Treatement, to Vaccines for all SARS-CoV-2 Variants

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Herein we report novel multifunctional silica nanoparticles, having a magnetic core surrounded by a silica shell. Fluorescent dye molecules (Rhodamine B) are incorporated into the silica shell, making them suitable for bioimaging applications. Our nanoparticles are characterized by excellent photo-bleaching resistance. Illumination with a monochromatic laser light (wavelength λ=561 nm and power=38 mW), via continuous wave method, of a nanoparticle sample causes the loss of only 33% of the nanoparticles' fluorescence intensity during 60 hours of illumination. Covalent bonding of the fluorescent molecules hinders any leaching of the dye into the environment making them highly stable.

The nanoparrticles are coated with biocompatible PEG chains. Due to their low cytotoxicity our PEG-coated silica nanoparticles are suitable for use in living cells and microorganisms. PEG-coated nanoparticles are known to exhibit good stability in crowded biological environments, such as the cellule. Aggregation tendency is significantly reduced. Good solubility in aqueous environments is another important advantage of the presented nanomaterial. The described nanoparticles are characterized by prolonged stability, which exceeds 6 months at room temperature in aqueous solutions. The lack of toxic, commonly used stabilizers, such as azides, is especially beneficial in case of biological, biochemical and medical research. These qualities of the nanoparticles make them potentially suitable for various biological and medical applications.

Biography

Michalina Iwan has obtained her master's degree from the Department of Chemistry at Warsaw University in Poland and completed her PhD in 2018 at the Institute of Physical Chemistry, Polish Academy of Sciences. She is a co-founder of a rapidly developing company SILIQUAN, specializing in production of non-toxic nanoparticles for pharmaceutical purposes.

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