Gold nanorods – the synthesis by the use of various gemini surfactants

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Nanoparticles of noble metals, especially gold nanoparticles, have fascinated scientists for over a century because of their unique properties which depends on their shape and size. In addition, nanoparticles may have potential application in modern biomedicine, for example in phototherapeutics and drug delivery. The aim of this study was to synthesize rod-shaped nanoparticles using different routes of synthesis, including addition of gemini surfactants. Seed-mediated growth method, with various surfactants, to obtain different size and prevent aggregation of nanorods, has been applied to produce gold nanoparticles. Oligomeric surfactant molecules used in this work consists of three components – hydrophobic, hydrophilic and linker groups. The formation of surfactant bilayers on the nanorods surface allows to electrostatically bind nucleic acid, what may be used in scaffolding for delivery system. Gold nanoparticles synthesized with different surfactants has been studied using Small Angle X-ray Scattering (SAXS) and Transmission Electron Microscopy (TEM). They were also characterized by UV-Vis spectroscopy and Nuclear Magnetic Resonance (NMR) diffusometry to get information about their size, shape and structure. Details of the reactions, such as different number of surfactants and silver nitrate in nanorod growth procedure, were taken into account, discussed and compared in this study.

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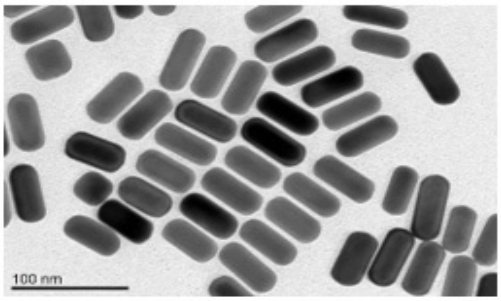

Figure 1: TEM image of rod-shaped nanoparticles.

Biography

Karolina Rucińska is a student of the 4th year of Medical Physics. She studies at Adam Mickiewicz University in Poznan, at Faculty of Physics and works on her master's degree thesis at Department of Macromolecular Physics. In this work, she synthesized rod-shaped nanoparticles, which have potential application in medicine, and characterized by spectroscopic and microscopic methods. This research project was supported by programme Best of the Best (Najlepsi z Najlepszych) 3.0 from Ministry of Science and Higher Education (Poland).

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