allied academies

International Conference on

Nanomaterials and Nanochemistry

November 29-30, 2017 | Atlanta, USA

Beata Kalska Szostko

University of Bialystok, Poland

Nanostructures and its stability in the different environment

The main reasons why iron based nanostructures and among them magnetite nanoparticles become a very popular subject for so many studies is huge applicable potential due to their universality, low toxicity to living organisms, and relatively high biodegradability. The fact, that magnetite as compound is considered as a biodegradable it significantly reduces a risk of environmental pollutions caused by nanostructures after the accomplishment of its function. The foreseen drawback is that solubility of magnetite is rather low in most of the solvents. That properties provides new advantages and allows to use it in many medicine related areas or wide range environmental protection. In addition, simple single phase nanoparticles can be modified layer-wise to obtain more advanced core-shell structures, where each part possess new useful properties and that way many multifunctional structures can be obtained. On the other hand, layered morphology helps to prevent the degradation process caused by different factors and related to that pollution or influence on the dissolution process what avoid toxicity of the final waste. Interplay between structural and magnetic properties of the received nanostructures permits to perform modifications by compounds containing free functional groups, where the most universal one are: amine, carboxylic, phosphonic or thiolate one. Such hybrid systems allows in following steps to capture specific compounds (heavy metals, derivatives of medicaments, pesticides, etc.) in rather easy way. Resultant heterostructures can be successfully extracted from the solution by the external magnetic field. Similarly many compounds present in human body can find its counterparts at the specially modified nanostructures surface and be analyzed. However, efficiency of it is related to synergic behavior of reaction environment/solution and inorganic cores/particles body. All these causes that number of studies related to nanostructures behavior in specific condition should be made and discussed in details. Therefore, exploration of the stability of magnetic nanostructures in different artificial and environmental solutions will be reported. The survey was performed in few types of liquids and variable temperatures. Nanostructures before and after tests were measured by: Transmission and Scanning Electron Microscopy, X-ray diffraction, Infrared and Raman spectroscopy, and Mössbauer spectroscopy to monitor changes of physicochemical properties as a result of the environment influence. The amount of Fe (Cu, Ag) atoms transferred into the solutions was estimated by Atomic Absorption Spectrometry. Obtained results allow to conclude that: (i) magnetite nanoparticles are only stable in all water-based solutions, (ii) magnetite nanoparticles has variable durability which is related to particles core-shell structure, (iii) Fe based nanowires are very unstable regardless of their structure in all tested liquides, (iv) temperature influences very significantly on nanostructures composition and therefore its properties.

Speaker Biography

Beata Kalska Szostko has completed in 2000 her Ph.D in Materials Physics from Uppsala University, Sweden. Her first postdoctoral position (2001-2003) was at Free University Berlin in Experimental Physics group. At the moment she is working at Chemistry Department University of Białystok, Poland. She is the Director of The Center of Synthesis and Analysis BioNanoTechno University of Bialystok, Poland. She has published more than 75 papers in reputed journals and has been serving as a reviewer for many scientific journals. She has more than 90 presentations of the results on National and International Conferences. She was and still is involved in an activity of few COST Actions.

e: kalska@uwb.edu.pl

Notes: