2nd International Conference on Advanced Materials for Bio-Related Applications

Core-shell SPION-based nanostructures for biomedical and environmental applications

Magdalena OSIAL, Paulina Pietrzyk-Thel, Michael Giersig

Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland, <u>mosial@ippt.pan.pl</u>

Nanocomposites, SPIONs, nanomedicine, environment

Nanomaterials are being intensively explored in a wide range of fields, from biomedicine to environmental sciences, due to their high volume-to-surface ratio and easy surface modification. Among a variety of nanomaterials, superparamagnetic iron oxide nanoparticles (SPIONs) and their nanocomposites also offer unique magnetic properties, making them a promising medical tool for local delivery of various drugs, such as anticancer, anti-inflammatory, etc., as well as acting as an imaging agent or as a nanoscale platform for tissue regeneration. At the same time, these materials offer the possibility of adsorption on the surface of many different molecules, making them versatile for use in water purification as well. Depending on the experimental conditions during synthesis, features such as size, shape and magnetic properties can be modulated and tailored for a specific application.

Here, we will discuss the importance of experimental conditions in the synthesis and surface modification of SPION and SPION-based materials, as well as their implications for potential applications in both biomedicine and environmental studies. The correlation between various synthesis conditions and the physicochemical properties of magnetic nanomaterials will be presented focusing on the interdisciplinary approach.



Figure 1. Schematic image of SPION-based suspension towards anticancer treatment and heat generation in alternating magnetic field