

## **PEG-b-poly(4-vinylbenzyl phosphonate) Coated Magnetic Iron Oxide Nanoparticles as Drug Carrier System: Biological and Physicochemical Characterization**

**Authors :** Magdalena Hałupka-Bryl, Magdalena Bednarowicz, Ryszard Krzyminiewski, Yukio Nagasaki

**Abstract :** Due to their unique physical properties, superparamagnetic iron oxide nanoparticles are increasingly used in medical applications. They are very useful carriers for delivering antitumor drugs in targeted cancer treatment. Magnetic nanoparticles (PEG-PIONs/DOX) with chemotherapeutic were synthesized by coprecipitation method followed by coating with biocompatible polymer PEG-derivative (poly(ethylene glycol)-block-poly(4-vinylbenzylphosphonate). Complete physicochemical characterization was carried out (ESR, HRTEM, X-ray diffraction, SQUID analysis) to evaluate the magnetic properties of obtained PEG-PIONs/DOX. Nanoparticles were investigated also in terms of their stability, drug loading efficiency, drug release and antiproliferative effect on cancer cells. PEG-PIONs/DOX have been successfully used for the efficient delivery of an anticancer drug into the tumor region. Fluorescent imaging showed the internalization of PEG-PIONs/DOX in the cytoplasm. Biodistribution studies demonstrated that PEG-PIONs/DOX preferentially accumulate in tumor region via the enhanced permeability and retention effect. The present findings show that synthesized nanosystem is promising tool for potential magnetic drug delivery.

**Keywords :** targeted drug delivery, magnetic properties, iron oxide nanoparticles, biodistribution

**Conference Title :** ICMN 2015 : International Conference on Microelectronics and Nanotechnology

**Conference Location :** Berlin, Germany

**Conference Dates :** May 21-22, 2015