Poster code:

M17

Superparamagnetic Iron Oxide and Quantum Dots for Biomedical Applications

Nur Khalida Rahayu Zainon[1,*], Che Azurahanim Che Abdullah[1], Mohd Basyaruddin Abdul Rahman[2], Mas Jaffri Masarudin[3]

[1]Department of Physics, Faculty of Science, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia
[2]Department of Chemistry, Faculty of Science, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia
[3]Department of Cell and Molecular Biology, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

*****Corresponding author's email: khalidarahayu87@gmail.com

Abstract. Nanomaterials has become insanely popular in biomedical field ranging from contrast agent applications in medical imaging to carriers in gene and drug delivery. Nanomaterials have unique properties that distinguish them from bulk materials in term of size, chemical reactivity, energy absorption and biological mobility. Magnetic nanoparticles (Fe_3O_4) posses superparamagnetic properties, which is widely known for its application as a contrast agent in MRI and as nanocarrier in targeted drug delivery. Semiconductor quantum dots (CdSe-ZnS) have strong fluorescent properties and the wavelength emitted depend sensitively on particle size. It have extensive applications in organic light emitting diode (OLED), sensor, and fluorescent biological labels. Current work are focusing on synthesis and characterization of biocompatible magnetic nanoparticles and fluorescence quantum dots, as well as toxicity of the nanomaterials for the biomedical application and gene therapy specifically. Magnetic nanoparticles (Fe_3O_4) and semiconductor quantum dots (CdSe-ZnS) are both synthesized using co-precipitation method and microwave irradiation technique respectively. The synthesized nanoparticles were characterized with X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), Transmission Electron Microscopy (TEM), and Vibrating Sample Magnetometry (VSM). The toxicity of both type of nanoparticles were tested on 2 different cell line; A549 human lung carcinoma and MRC5 human lung fibroblast using MTT assay. This research explores the potentials of these two types of nanomaterials in biomedical applications.

Keywords: gene therapy, nanocarriers, magnetic nanoparticle, quantum dots.