Contribution ID: **344** Type: **Poster**

Ionizing Radiation Engineered Functional Nanogels for Biomedical Applications

Thursday, 27 April 2017 14:15 (2 hours)

Nanoscale therapeutic systems have emerged as novel therapeutic modalities for cancer treatment and are expected to lead to major advances in cancer detection, diagnosis and treatment. At Nuclear Malaysia we have developed a nanoplatform that would be suitable to use for the targeted delivery of imaging and therapeutic agents.

Nanogels are nanoparticles consisting of internally cross-linked hydrophilic polymers of sub-micrometer size. The polymeric nanogels used in this study were synthesized via irradiation of polyethylene glycol-diacrylate (PEG-DA) using electron beam. Radiation induced synthesis of nanogels not only ensures polymer cross-linking, but also particle size control, chemical functionalization and sterilization of the product material. In addition it has the advantage of ease of scale up and the absence of potentially toxic monomers and cross-linking agents. With superior colloidal stability, inertness in the bloodstream and high drug loading capacity, nanogels make an ideal nanocarrier for biomedical applications.

The prepared nanogels were characterized by scanning electron microscopy (SEM). Their size and zeta potential were measured using dynamic light scattering and zeta potential analyzer respectively. Biocompatibility of the nanoparticles were assessed by MTT assay.

To assess the applicability of the nanogels as a drug carrier, a tumor targeting peptide is appended to the nanoparticle to endow it with tumor homing/targeting capability. Additionally, to track its biodistribution in vivo, it was radiolabeled with a suitable positron emission tomography (PET) radioisotope and scanned using a PET camera to assess its tumor targeting capability and accumulation.

Country/Organization invited to participate

Malaysia

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Session Classification: P-A2

Track Classification: RADIATION SYNTHESIS AND MODIFICATION OF MATERIALS