High emission efficient and tunable room temperature phosphorescence arising from Pd-porphyrins entrapped in Gemini surfactant micelle hybridized supramolecular gel

Hong Wang*, Yajiang Yanga
School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, Wuhan 430074, China

Poly (vinyl alcohol) (PVA) microspheres are a kind of vascular embolic materials commonly used in clinic for the interventional therapy of tumor. The drug loaded magnetic PVA microspheres would be combined with chemoembolization and magnetic mediated hyperthermia, which also could be seen under magnetic resonance (MR). In this paper, PVA microspheres encapsulated in situ-forming superparamagnetic iron oxide nanoparticles (SPIO NPs) have been prepared by one step using a T-junction droplet-based microfluidic device. Herein, PVA aqueous solution containing Fe2+/Fe3+ salt was used as dispersed phase and liquid paraffin containing surfactants was used as a continuous phase. The PVA droplets containing Fe2+/Fe3+ salt formed in the microchannel were dripped into NaOH solution. Wherein, SPIO NPs were formed by the reaction of Fe2+/Fe3+ with OH-, and the in situ synthesized SPIO NPs acted as a cross-linking agent for PVA to form PVA microspheres. The obtained magnetic PVA microspheres had regular morphology with uniform size (~320 μm). Under external alternating magnetic field, the temperature of the microspheres dispersion was elevated more than 8 □ and the magnetic microspheres could be detectable under the magnetic resonance imaging (MRI). The results of cytotoxicity test showed that microspheres had good biocompatibility. While the cytotoxicity of the doxorubicin-loaded microspheres under 42 □ was more than that under 37 □, which indicated that the hyperthermia therapy and chemotherapy had synergetic effect to kill the tumor cells. Thus, the one-step prepared magnetic drug-loaded PVA microspheres integrated interventional chemoembolization therapy, hyperthermia therapy and MR visualization.

hongwzy@hust.edu.cn