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# Nondegradable magnetic poly (carbonate urethane) microspheres with good shape memory as a proposed material for vascular embolization

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**Abstract:** In this study, nondegradable poly (carbonate urethane) (PCU) and poly (carbonate urethane) incorporated variable  $\text{Fe}_3\text{O}_4$  content microspheres (PCU/ $\text{Fe}_3\text{O}_4$ ) were synthesized using pre-polymerization and suspension polymerization. Synthesis was confirmed through Fourier transform infrared spectroscopy (FTIR). The effect of  $\text{Fe}_3\text{O}_4$  incorporation was investigated on crystalline, thermal, shape memory and degradation properties by X-Ray diffraction (XRD), Differential scanning calorimetry (DSC), compression test and degradation in vitro, respectively. Otherwise, the assessment of magnetic characteristics by vibrational sample magnetometry (VSM) disclosed superparamagnetic behavior. The tunable superparamagnetic behavior depends on the amount of magnetic particles incorporated within the networks. The biological study results of as-synthesized polymers from the platelet adhesion test and the cell proliferation inhibition test indicated they were biocompatible in vitro.  $\text{Fe}_3\text{O}_4$  incorporation was conducive to reducing platelet adhesion in blood contacting test and promotion of rat vascular smooth muscle cell proliferation and growth. These nondegradable, superparamagnetic, biocompatible polymers, combined with their good shape memory properties may allow for their future exploitation in the biomedical field, such as, in cardiovascular implants, targeted tumor treatment, tissue engineering and

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