

Extra-Large Pore Mesoporous Silica Nanoparticles Embedded with Multi-Core Magnetic Nanoparticles for Cancer Therapy

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The nanocarrier-based drug delivery is an attractive way to solve the problems that the conventional chemotherapy has, such as lack of targeting ability and low drug bioavailability. The mesoporous silica nanoparticles (MSNs) are one of the most common nanocarriers due to their mesopores, high surface area and large pore volume. However, There are still needs to develop MSNs with larger mesopores and intrinsic functionality such as magnetic characteristics for magnetic separation and imaging. Here, we propose an one-pot synthesis of MSNs with extra-large pores (20–35 nm) embedded with a spherical assembly of multiple iron oxide nanoparticles. The size of core assembly of magnetic nanoparticles could be easily controlled by changing the polarity of the reaction solution and the amount of existing iron oxide nanoparticles in the solution. The removal of iron oxide core resulted in hollow interior inside MSNs with extra-large pores, which enabled the high loading of large biomolecules such as cancer antigen and enzymes for cancer therapy.