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Properties of ferritin embedded in PVA nanofibers

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We present the morphological and the magnetic properties of ferritin embedded poly(vinyl alcohol) (PVA) nanofibers. The monodispersed natural ferritin (MF) and the clustered superparamagnetic (SPM) one (CF), with a diameter of around 900 nm, were embedded into the biocompatible PVA nanofibers using the electrospinning method. To compare the morphological difference between the MF and the CF samples, we also performed the high-resolution transmission electron microscopy (HR-TEM) and the scanning electron microscopy. Superconducting-quantum-interference device was used to analyze the magnetic properties. The CF exhibits a SPM behavior,even though the size is significantly large. The magnetic phase of CF is partly changed from the antiferromagnetic to the ferromagnetic ordering, depending on the heat treatment temperature. The HR-TEM image displays that the giant cluster is composed surprisingly of a large amount of ferritin cores without destruction of the core shell. The CF keeping the SPM phase was successfully synthesized into the PVA nanofiber, and the SPM properties were analyzed in comparison with the natural ferritin embedded in PVA nanofiber. Additionally, an aging phenomenon was observed and the coercive field of CF increases after aging. The obtained results provide us a possibility to manipulate the size and the magnetic ordering inside a biocompatible superparamagnet and to realize the biomedical electric devices.