detected by AlamarBlue assay. The complexes of pEI8-SPION/DNA induced the highest transfection efficiency. Moreover, the complexes, prepared at a pEI8-SPIONs/DNA mass ratio of 8/1, induced higher levels of gene expression compared to that of ExGen 500 as a positive control. Importantly, these pEI-SPIONs revealed low cytotoxicity with a cell viability of more than 80%. The results imply that cationic SPIONs are highly promising for safe and efficient gene delivery and MR imaging.

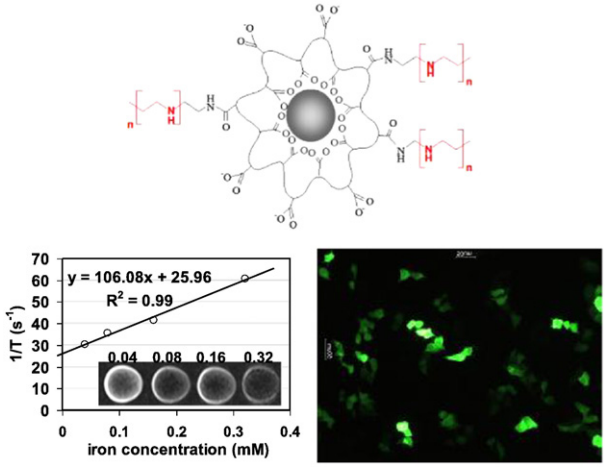

Fig. 1. (A) Schematic structure of SPIONs, (B) SPIONs for MR imaging (L) and *in vitro* gene transfection in MCF-7 cells (R).

Keywords: Gene delivery, Polyethylenimine, MR imaging, Superparamagnetic particle

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A controlled release system of biomacromolecules by encapsulating nanoparticles in electrospun cellulose acetate butyrate nanofibers

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Electrospun nanofibers are easy to be functionalized through adding functional chemicals, biomacromolecules and nanomaterials to the polymer solution. These unique properties along with the extra functions brought by the polymer materials have made nanofibers imperative for applications as diverse as drug release, tissue engineering, filtration, reinforcement and many others. Considerable efforts have been made to explore the controlled release function of electrospun nanofibers [1], while most of them could only release one specific substance. Herein, we report the encapsulation of abundant nanoparticles into electrospun cellulose acetate butyrate (CAB) nanofibers.

The core–shell structured nanoparticles were prepared by an oil-in-water emulsion method. Briefly, 300 mg poly(ε-caprolactone) (PCL) and 10 mg of tocopherol were dissolved in 10 mL of methylene chloride. The organic phase was dissolved in 40 mL of polyvinyl alcohol (2 wt.%) and 10 mg of bovine serum albumin (BSA). After ice bath, sonication and magnetic stirring, the suspension was centrifuged and lyophilized to obtain freeze dried nanoparticles. The electrospinning solution was prepared by blending the nanoparticles (0.2 wt.%) and CAB (15 wt.%) in acetone/dimethylformamide (3/1 v/v).

It should be noted here that both the shell (PCL) and the core (BSA) could be formed by many other materials, depending on the ultimate usage. Our previous study has found that Schwann cells exhibiting prompt proliferation and regulated orientation on electrospun CAB nanofibers [2]. Their unique porous internal structure, which was caused by the fast evaporation of acetone, allows an easy loading of the nanoparticles, as demonstrated by the confocal images in Fig. 1. The core part of the nanoparticle could be gradually released via the biodegradation of the fiber and the shell. The release rate could be further tailored by adjusting the composition of the fibers and the nanoparticles. In summary, a controlled release system was acquired by encapsulating core–shell structured nanoparticles into electrospun CAB nanofibers. The method, once established, opens a versatile path to load various biomacromolecules into fibrous scaffolds.

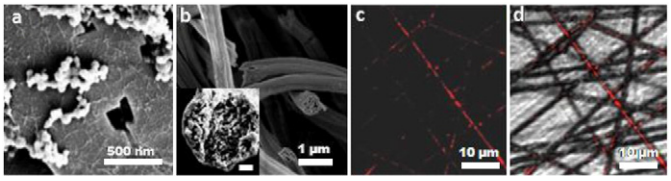

Fig. 1. a, b) SEM images of PCL/BSA nanoparticles and electrospun CAB nanofibers (scale bar of the inset = 100 nm); c, d) confocal images of CAB nanofibers encapsulated with PCL/BSA nanoparticles.

Keywords: Controlled release, Nanoparticles, Nanofibers, Electrospinning

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Interactions of the gene carrier polyethylenimine with serum albumin

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In the past decade, gene therapy has been attracting more and more attention as an effective method to treat cancer, innate immunodeficiency, and cardiovascular diseases. Among non-viral gene vectors, polyethylenimine (PEI) has been one of the most widely studied use ones. For *in vivo* applications, genes and their vectors are often intravenously administered and transported by blood to target tissues or organs. In this situation, the genes and vectors would interact with