Controlled Release Systems Based on Electrospun Nanofibers and Hydrogel

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Recent advances in polymer and microgels have led to the development of materials that exhibit the ability to control release of encapsulated materials and undergo repair. In here, we developed a novel strategy to control the motion and drug release of self-healing microhydrogels together. Polylactic acid (PLA) nanofibers containing superparamagnetic nanoparticles (SPION) and a model compound were entrapped inside microhydrogels based on polyphenol-conjugated hyaluronic acid with the aim to develop carrier systems capable of self-healing and magnetic responsive delivery. The composite structures were prepared by a combination of electrospinning and spraying. The physically sprayed microparticles were ionically crosslinked with aqueous ferric ions, which enabled self-healing behavior. PLA-SPION entrapped microhydrogels were magnetic responsible because of the presence of PLA-SPION inside the microhydrogels. PLA-SPION entrapped microhydrogels showed a fast attachment in the presence of external magnetic force. Even after 10 min bath sonication the attached microhydrogels were not detached or dispersed. It concluded that the self-healing carrier system was successfully developed based on polyphenol-conjugated hyaluronic acids.