Production of Heparin-Functionalized Microgels in Microfluidic Devices

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Hydrogels which are highly hydrated cross-linked polymer networks, have attracted large interest in drug delivery due to their biocompatible and stimuli-responsive properties. Especially, biological responsiveness of hydrogels including enzyme-sensitive domains have demonstrated significant promise to mimic the extracellular matrix (ECM) structure and function. We have developed approaches for producing biologically responsive hydrogels via integration of non-covalent heparin-protein interactions with chemical crosslinking methods. The hydrogel networks via these strategies suggest opportunity for Non-covalent and covalent degradation. Furthermore, monodisperse microgels were fabricated using a continuous microfluidic process called a stop-flow lithography. The use of monodisperse microgels in drug livery systems will offer considerable advantages compared to previous polydisperse ones with respect to predicting and modeling of their rheological and degradable behavior.