Thermo-Sensitive Poly(NIPAM)-Based Mats with High Porosity as Potential Scaffolds for Tissue Engineering

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We have studied the thermal behavior of electropsun amphiphilic, symmetric triblock copolymers with short polystyrene (PS) end blocks and a large poly(N-isopropylacrylamide) (PNIPAM) middle block exhibiting a lower critical solution temperature (LCST) in aqueous solution. An electrospinning technique was applied to fabricate hydrogel nanofibers scaffolds with controllable pore size and a highly aligned structure. The scaffold pore diameter change as a function of temperature was evaluated and, as expected, pores decreased in diameter when the temperature was raised to 37°C. As expected the absolute surface area of the nanofibrous scaffold surpassed that of conventional membranes. The function of cell adhesion was seen to be a direct correlation to the function of temperature with the LCST as the control factor. Cell growth was observed to be dependent on the fibers orientation and consequently the cell growth on the highly aligned fibers were seen to be aligned amplifying the potential for the application of this system in specialized cell growths such as neurite regeneration.