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Patterned Poly-N-isopropylacrylamide Surfaces for Culture and Harvest of Muscle Fibers SAMUEL DUPONT, KRANTHI KUMAR ELINENI, NATHAN GALLANT, RYAN TOOMEY, University of South Florida — Swelling of surface confined poly-N-isopropylacrylamide (pNIPAAm) structures leads to non-uniform patterns that can be switched by a thermal cue. Based on the geometry of the surface confined patterns, various forms of structural instabilities arise such as bulk buckling, differential lateral swelling and edge buckling. Instabilities that arise from the swelling of patterned pNIPAAm surfaces present a unique platform for tissue engineering applications. Recent work has demonstrated the attachment, survivability, and alignment of fibroblasts grown atop rectangular pNIPAAm surface extrusions. Detachment of contiguous and aligned fibroblasts grown on these surfaces was observed when the geometry of the structure was such that a bulk buckling instability formed upon thermally induced gel swelling. Current work is aimed at utilizing this switchable platform to culture aligned myoblasts, which upon differentiation, form multicellular myotubes, an important structure in skeletal muscle. Myotubes for tissue engineering can then be harvested by non-enzymatic detachment facilitated by thermally induced non-uniform gel swelling.

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