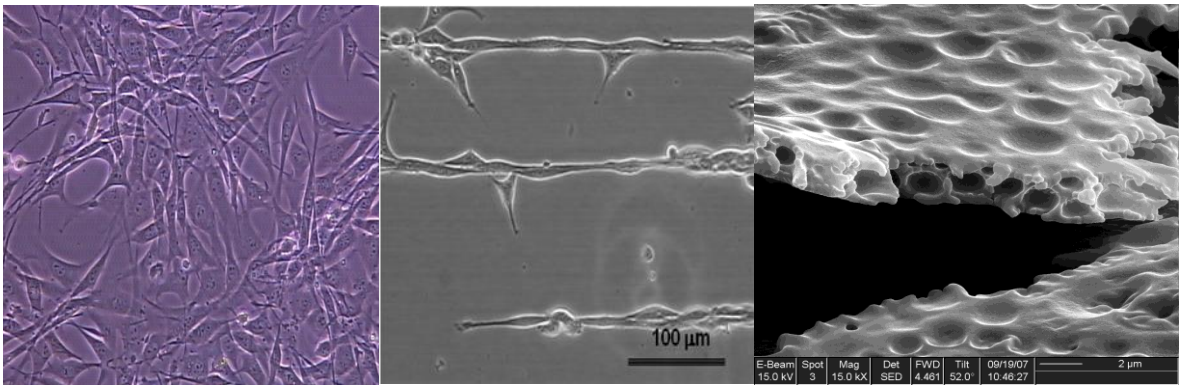
Zein Nanofabricated Biomaterials for Tissue Scaffolding

Nanotechnology methods were used to guide the growth of epithelial tissues into a printed design. Mouse fibroblast cells attached themselves to zein strips printed on silica wafers by micro-contact printing techniques. The experiment indicated that printed zein can be used to guide the spatial location of cells and guide their growth into tissues of defined geometry; for example, sheets of tissue of specific area or thickness.

Biomaterials are an integral component of tissue engineering, which is the combined use of cells, materials and biochemical factors to repair or replace living tissues. Cells are seeded into an artificial structure or scaffold capable of supporting tissue formation. Scaffolds allow cell attachment, enable diffusion of nutrients, and exert mechanical influences on the forming tissue. Biodegradability is an important factor since scaffolds are expected to be absorbed by the surrounding tissues. However, the rate of scaffolding degradation has to match the rate of tissue formation. The scaffold should provide structural integrity within the body while the new tissue is formed but eventually break down leaving the newly formed tissue. Zein, a protein abundant in corn, is a natural biocompatible product that is recognized for its ability to form ordered structures such as fibers and films. Zein may offer biodegradation rates intermediate between other natural materials and synthetic polymers. Nanostructured zein may become a new soft biomaterial with potential applications in the construction of tissue scaffolding for repairing or replacing epithelial tissues, ophthalmic tissues, and healing of spinal cord injuries.

Figure shows SEM images of a) fibroblast cells; b) fibroblast cells growing on patterned zein strips; c) nanostructured zein forming sub-micron size tubes.



Wang Q, Xian W, Li S, Liu C, Padua GW. Acta Biomaterialia 2008 **4** (**4**): **844-851.**

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