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Manufacturing Novel Biomaterials by Elongation of Fibers from Highly Viscous Polymer Solutions (I)

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Biomaterial fabrics have numerous biomedical applications ranging from drug delivery to tissue engineering. A variety of approaches are available for generating biomaterial fibers from various precursor polymer solutions. Approaches such as wet-spinning, electrospinning, and extrusion have been exploited in the past to generate extremely long fibers ranging in diameter from tens of nanometers to hundreds of microns. An alternative approach for manufacturing polymer fibers is to utilize a dry-spinning approach that generates fibers by balancing the cohesive forces within a highly-concentrated and highly-viscous polymer solution with the adhesive forces of this fluid with a solid substrate applicator. This approach can be used to generate a multitude of fibers that can be arranged on a collector to generate large scale fabrics from a variety of polymer precursor solutions. This presentation will describe the working principals underlying this approach to biomaterial fabric production, along with preliminary material characterization data. Applications in the release of drugs and the templating of protein networks for directing cell growth will also be described. The versatility and potential of these materials for wound reconstruction, as well as in non-biomedical industrial applications will also be highlighted.

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