Polymer Electrospun Nanofibers as Building Blocks for Nanotechnology

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Polymeric nanofibers realized by electrospinning technology are very advantageous nanostructures by virtue of their ultra-high surface to volume ratio, offering the opportunity to easily control the surface topography and chemical composition for many nanotechnological applications.

In biomedical engineering, the research of new scaffold design is addressed by nanomaterials mimicking fibrous extracellular matrix micro-environments. Tailoring polymer nanofibers is made possible by means of specific biological functions incorporating molecules in the electrospinning solution, or functionalizing the external surface of nanofibers by linking molecules, such as cell adhesive proteins and peptides.

On the other hand, active nanofibers are also interesting for their confinement effects on electronic and optical properties. In particular, active, flexible, fully organic nanofibers, realized by light emitting polymers and composites, show tunable emitting properties, and are attracting building blocks as low-cost photon sources. The integration of active organic nanostructures in microfluidic devices is especially relevant for high-sensitivity diagnostic applications. In this context, the main challenge is to dispose of miniaturized light-sources integrated into lab-on-chips, involving very tiny needed liquid volumes for ultimately single reaction diagnostic.

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