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**Nanofibers And Related Structures Formed By Polymerization**

S. V. DOIPHODE, D. H. RENEKER, The Maurice Institute of Polymer Science, The University of Akron — Nanofibers of cyanoacrylate were obtained by polymerization from the monomer vapor at a temperature near room temperature. The nanofibers had diameters ranging from 20 nm to 100 nm and lengths of up to several millimeters. Water molecules present on the substrate initiated the living anionic polymerization. As growth continued, the living ends were carried on the tip of each growing nanofiber. These nanofibers formed on glass, metal, plastic, electrospun nanofibers of other polymers, and other surfaces. Some fibers were tapered, some were branched, and some were bent. The number of fibers was varied by controlling the exposure of the substrate to water vapor. Under different conditions the monomer vapor was collected as droplets along electrospun nanofibers, or as droplets at the points where two electrospun nanofibers crossed. The addition of the initiator caused the droplets to polymerize, forming permanent beads on the fibers, and strong mechanical connections at the cross points. This phenomenon provides new ways to construct nanofiber structures engineered on nanometer scales. For example, filters constructed from an open structure of fibers can be coated with nanofibers polymerized from a vapor of nanometer scale droplets flowing through the structure, to improve the capture of molecules or particles.

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