

Abstract Submitted
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Semi-crystalline PMMA Stereocomplex Fibers¹ MATIJA CRNE, School of Chemistry and Biochemistry, Georgia Institute of Technology, SHIN-WOONG KANG, Department of Physics, Kent State University, JUNG OK PARK, School of Polymer, Textile and Fiber Engineering, Georgia Institute of Technology, SATYENDRA KUMAR, Department of Physics, Kent State University, MOHAN SRINIVASARAO, School of Polymer, Textile and Fiber Engineering, Georgia Institute of Technology — A mixture of isotactic and syndiotactic PMMA polymers forms a supramolecular helical structure, called “stereocomplex” PMMA, which is held together by non-covalent bonding. The helices can pack together, resulting in a semi-crystalline material with a melting point of 172°C. Furthermore, the solutions exhibit gelation behavior in appropriate solvents. We have utilized these properties to make oriented stereocomplex PMMA fibers by three different methods – wet spinning, gel spinning and electrospinning. These fibers are highly oriented and crystalline. They are resistant to high temperatures up to 160°C. They are also resistant to the PMMA polymerization conditions. We have examined the fibers using X-ray diffraction and Raman spectroscopy. The results agree with the recently proposed triple helical structure where two isotactic PMMA chains wrap around each other in a double helix and then the syndiotactic chain wraps around this double helix. The resulting structure is a triple helix with a 1:2 molar ratio of isotactic : syndiotactic PMMA.

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