

Abstract Submitted  
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**The Elastic Properties of Polymer Nanofibers: Influence of Confinement on Conformation State of Macromolecules and Supermolecular Structures**<sup>1</sup> ARKADI ARINSTEIN, MICHAEL BURMAN, EYAL ZUSSMAN, Technion - IIT Faculty of Mechanical Engineering — This research deals with open problems concerning polymer materials with reduced size and dimension such as thin and ultra thin films, nanofibers, and nanotubes. Such materials exhibit exceptional mechanical properties compared to those of their macroscopic counterparts. In particular, abrupt increase in Young modulus of polymer nanofibers has been observed when their diameters became small enough. Such features are poorly understood, and lack of explanation of the observed phenomena, based on mechanical (macroscopic) concepts, requires detailed microscopic examination of systems in question. We hypothesize that the supermolecular structure is the dominant role in the deformation process of polymer nanofibers, more precisely, confinement of this supermolecular structures which is caused by shrinking of the transversal size of above objects. In this work we report on results of our studies in conformational statistics of polymer macromolecules under conditions of confinement, and supermolecular structure formation; and on experimental studies of the mechanical and structural properties of electrospun nanofibers.

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