

Abstract Submitted
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Polymer network stretching during electrospinning¹ ISRAEL GREENFELD, ARKADII ARINSTEIN, Technion, KAMEL FEZZAA, Argonne National Laboratory, MIRIAM RAFAILOVICH, State University of New York, Stony Brook, EYAL ZUSSMAN, Technion — Fast X-ray phase contrast imaging is used to observe the flow of a semi-dilute polyethylene oxide solution during electrospinning. Micron-size glass particles mixed in the polymer solution allow viewing of the jet flow field, and reveal a high-gradient flow that has both longitudinal and radial components that grow rapidly along the jet. The resulting hydrodynamic forces cause substantial longitudinal stretching and transversal contraction of the polymer network within the jet, as confirmed by random walk simulation and theoretical modeling. The polymer network therefore concentrates towards the jet center, and its conformation may transform from a free state to a fully-stretched state within a short distance from the jet start.

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Israel Greenfeld
Technion

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