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AFM in Polymer Research

Abstract. Polymers are the material of choice in many applications. They can be tailored to have unique properties and are often less expensive, more durable, and more sustainable than other materials. Creating and implementing new polymers requires knowledge of how structure, processing, properties, and performance are related. Understanding these effects at the molecular or microstructural level requires that this information be acquired with micro- and nanometer resolution.

Whether investigating fundamental principles of polymer science or engineering a specific polymer solution, the AFM is a key instrument for evaluating polymers at small length scales. Its spatial resolution enables visualization of sub-micrometer and sub-nanometer polymer morphology. But AFMs can contribute much more information about polymers besides simple topographic morphology, including probing molecular-level forces; mapping mechanical, thermal, and electrical properties; and assessing solvent and thermal effects in near real time.