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**AFM force measurement on nano scale Polystyrene**[1] ZAHRA FAKHRAAI, TIANYI LIU, GUOYU YANG, Univ of Penn, ZAHRA FAKHRAAI TEAM — Large surface/volume ratio can significantly change the mechanical properties of polymer film with nanometer thickness. Intuitively, the average response contains a larger component of the liquid like layer on the surface compared with the bulk, which should lead to reduced elastic constant. But the ultra small length scale makes it challenging to directly measure the viscoelastic response of nanostructured polymers. When the film thickness is decreased, some measurement supports that the elastic moduli of amorphous polymer films also decreases , while others show the rubbery modulus stiffens. Though the indentation on millimeter and micrometer scale has become common, not much research has investigated the yield stress and strain on nano scale indentation, which contains much larger percentage and effect from the free surface layer. In this study, we use regular AFM tip to indent onto the surface of polystyrene nanodroplets, under various loading speeds to study relaxation times and mechanical response in these systems.

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