

Abstract Submitted  
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**Study the friction behaviour of poly[2-(dimethylamino)ethyl methacrylate] brush with AFM probes in contact mechanics** MARYAM RAFTARI, Department of Physics and Astronomy, University of Sheffield, UK, ZHENYU ZHANG, Department of Physics, University of Sheffield, UK, GRAHAM J. LEGGETT, Department of Chemistry, University of Sheffield, UK, MARK GEOGHEGAN, Department of Physics and Astronomy, University of Sheffield, UK — We have studied the frictional behaviour of grafted poly[2-(dimethylamino)ethyl methacrylate] (PDMAEMA) films using friction force microscopy (FFM). The films were prepared on native oxide-terminated silicon substrates using the technique of atom transfer radical polymerization (ATRP). We show that single asperity contact mechanics (Johnson-Kendall-Roberts(JKR) and Derjaguin-Muller-Toporov(DMT)) as well as a linear (Amontons) relation between applied load and frictional load depending on the pH of the FFM probe. Measurements were made using functionalized and unfunctionalized silicon nitride triangular probes. Functionalized probes included gold-coated probes, and ones coated with a self-assembled monolayer of dodecanethiol (DDT). The frictional behaviour between PDMAEMA and all tips immersed in pH from 3 to 11 are corresponded to the DMT or JKR model and are linear in pH=1, 2, and 12. These results show that contact mechanics of polyelectrolytes in water is complex and strongly dependent on the environmental pH.

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