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Frictional properties of the end-grafted polymer layer in presence of salt solution MARYAM RAFTARI, ZHENYU ZHANG, Department of Physics and Astronomy, University of Sheffield, Sheffield S3 7RH, UK, GRAHAM J. LEGGETT, Department of Chemistry, University of Sheffield, Sheffield S3 7HF, UK, MARK GEOGHEGAN, Department of Physics and Astronomy, University of Sheffield, Sheffield S3 7RH, 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). These brushes had constant grafting density (1.18 nm2), and of a thickness of ∼66 nm, as measured by ellipsometry. We show that single asperity contact mechanics (Johnson-Kendall-Roberts (JKR) and Derjaguin-Müller-Toporov (DMT) models) as well as a linear (Amontons) relation between applied load and frictional load all apply to these systems depending on the concentration of salt and the nature of the FFM probe. Measurements were made using gold-coating and polymer functionalized silicon nitride triangular probes. Polymer functionalized probe included growth the PDMAEMA with same method on tips. The frictional behaviour are investigated between PDMAEMA and gold coated and PDMAEMA tips immersed in different concentrations of KCl, KBr and KI.

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