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Template-Induced Enhanced Ordering under Confinement BETUL YURDUMAKAN, KUMAR NANJUNDIAH, GARY HARP, ALI DHINOJWALA — We report a direct observation of a confined structure between two surfaces, oxidized poly(dimethylsiloxane) (PDMS^{ox}) elastomer and methyl terminated self-assembled monolayer (OTS) on sapphire substrates, using sum frequency generation spectroscopy. The Si-(CH₃)₂ groups of short PDMS chains at this interface exhibit a surprisingly strong order upon confinement that is comparable to that of a well packed OTS. This enhanced ordering is induced by the template of ordered methyl groups of OTS and is not observed for other surfaces (fluorinated monolayers and sapphire substrates). This strong ordering is reminiscent of layering observed for confined symmetric molecules between two mica surfaces, but was expected to vanish between rough macroscopic surfaces. Friction and adhesion properties of the same interface are evaluated with a sliding contact and JKR technique, respectively. These results provide new insights on confined structure at the interface between two solids and are important in the understanding of surface controlled processes of practical importance such as friction and adhesion.

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