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Kinetics of Grafting and Loop Formation of Telechelic Polymers on Solid Substrate[1] MARK DADMUN, ZHENYU HUANG, HAINING JI, JIMMY MAYS, University of Tennessee — A simple system was used to examine loop formation at polymer/substrate interfaces. Telechelic polystyrene terminated with carboxylic acid end groups was grafted from the melt onto a silicon wafer modified with epoxy-terminated silane layers. This study focuses on understanding how molecular weight, annealing temperature, and surface functionality affect the grafted amount and grafting kinetics. It was found that the practical limit of the grafted amount scales as R_g leading to a -0.5 power law for the surface density as a function of molecular weight. The kinetic results suggest that the grafting process is most likely reaction controlled. By labeling the free carboxylic acid groups on singly bound chains with a fluorescence probe, the time dependence of the amount of the singly bound chains was monitored using fluorimetry. The obtained results provide a method to control the loop formation at interfaces and understand their structure and properties.

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