Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

**Adsorption-induced fracture of branched macromolecules.**[1] SERGEI SHEIKO, FRANK SUN, DAVID SHIRVANYANTS, MICHAEL RUBINSTEIN[2], HYUNG-IL LEE, KRZYSZTOF MATYJASZEWSKI, Carnegie Mellon University — Recently, we have discovered the remarkable phenomenon that brush-like macromolecules with long side chains undergo scission of the backbone bonds as a result of adsorption onto a substrate. The macromolecule's self-destruction occurs because its side chains stretch the polymer backbone as the macromolecule struggles to reconfigure and maximize the number of contacts with the substrate. We show that the tension imposed by the surface attraction is unevenly distributed over the covalent bonds of the molecular skeleton. Along the brush axis, a major fraction of the tensile force is carried by the backbone, while in the perpendicular direction the tension is distributed over many side chains. Using molecular visualization and computer simulation, we confirmed the first order kinetics and measured the corresponding rate constant, which revealed strong dependence on the attraction to the substrate.

[1]This research program was supported by the National Science Foundation (ECS 0103307 and DMR 0306787)
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Date submitted: 16 Jan 2006 Electronic form version 1.4