Abstract Submitted
for the NWS12 Meeting of
The American Physical Society

Microsphere interaction with non-Newtonian solid-supported films to model respiratory therapies NATHAN LEE, JAVED ALLY, MICHAEL KAPPL, HANS-JÜRGEN BUTT, Max Planck Institute for Polymer Research — Films used as lubricants and particle filters interact with microspheres. One example of a biological particle filter is the mucus lining the human respiratory system. In the conducting airways of the respiratory tract, a 10 μm thick layer of mucus sits on top of a periciliary layer. These cilia sweep the mucus towards the nose and mouth whereby debris, such as dust and bacteria that are trapped by the mucus layer, may be expelled from the body. Mucus, like other biofluids, can be modeled after a non-Newtonian fluid due to their viscoelastic properties. Interactions between particles and non-Newtonian thin films have not been widely characterized. Atomic force microscopy (AFM) is an ideal technique due to its ability to measure in the microNewtown and micrometer scale. The AFM setup also allows for calculation of the force from direct contact of the particle with the film. Data from these experiments may further the development aerosol-based respiratory therapies. Factors such as particle size and approach speed are necessary to determine improved parameters for drug deposition and retention. It is the goal of this study to analyze interaction forces between particles and non-Newtonian solid-supported films.

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Date submitted: 18 Sep 2012 Electronic form version 1.4