

Laser-induced particle desorption and adhesion force investigations

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Particle removal by pulsed lasers is of fundamental importance in cleaning technologies and conservation science. In the case of mechanical desorption processes [1,2] adhesion forces have to be quantified. This was realized by scanning force microscopy (SFM). Polystyrene spheres attached to SFM cantilevers served as model particles. Pull-off forces on polymer and silicon substrates in the range of 50-200 nN were detected, which is about one order of magnitude lower than the predictions by theoretical models [3]. Therefore multiple contacts, asperities on the spheres, and humidity have to be considered [4]. These investigations are correlated with particle acceleration measurements induced by surface acoustic waves generated by laser pulses. Thus, an quantitative experimental comparison between the adhesion force and repulsive force caused by the surface acceleration become accessible.

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