

Abstract Submitted  
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**Surface adsorbates and mechanical dissipation in micromechanical resonators**<sup>1</sup> THOMAS METCALF, BRADFORD PATE, JEFFREY BALDWIN, BRIAN HOUSTON, Naval Research Laboratory, MAXIM ZALALUTDINOV, SFA, Inc. — Temperature dependence measurements of the mechanical quality factor of a silicon micromechanical resonator found a pronounced dissipation peak in the neighborhood of 160 K, the magnitude of which reduced dramatically upon in-situ annealing<sup>2</sup>. Present in all of the resonator's normal modes, the peak is sufficiently broad so that the mechanical dissipation was observed to decrease with increasing temperature near room temperature, indicating that this loss mechanism contributes significantly to the room-temperature dissipation value. The leading candidates for the origin of the dissipation are surface adsorbates (e.g. water). We report an investigation of the dissipation of micromechanical resonators (between  $\sim 100$  K and room temperature) with carefully prepared and characterized surfaces as a function of adsorbate and of adsorbate coverage.

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<sup>2</sup>Haucke, *et al.*, Appl. Phys. Lett. **86**, 181903 (2005)

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