Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Tribo-induced melting and temperature gradients at sliding asperity contacts J. KRIM, L. PAN, D.J. LICHTENWALNER, North Carolina State University, A.I. KINGON, Brown University — Tribo-induced nanoscale surface melting mechanisms have been investigated by means of a combined QCM-STM technique [1] for a range of Au and Au-Ni alloys with varying compositional percentages and phases. The QCM-STM setup allows studies to be performed at sliding speeds of up to m/s, and also reveals valuable information concerning tip-substrate temperature gradients.[3] A transition from solid-solid to solid-"liquid like" contact was observed for each sample at sufficiently high asperity sliding speeds. Pure gold, solid-solution and two-phase Au-Ni (20 at.% Ni) alloys were compared, which are materials of great relevance to MEMS RF switch technology.[2] The transition points agree favorably with theoretical predictions for their surface melting characteristics. We acknowledge NSF and AFOSR support for this research.

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[3] C.G. Dunkle, I.B. Altfeder, A.A. Voevodin, J. Jones, J. Krim and P.Taborek, J. Appl. Phys., 107, art#114903, (2010)

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Date submitted: 21 Nov 2011 Electronic form version 1.4