Abstract Submitted
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Tribo-induced melting transitions and internal friction at magnetic and nonmagnetic asperity contacts[1] JACQUELINE KRIM, LIMING PAN, KEELEY STEVENS, North Carolina State University — We report a study of tribo-induced nanoscale surface melting mechanisms that employs a combined QCM-STM technique [1] for a range of Au and Au-Ni alloys with varying compositional percentages and phases [2]. A transition from solid-solid to solid-"liquid like" contact was observed for most samples at sufficiently high asperity sliding speeds. Pure gold, solid-solution and two-phase Au-Ni (20 at.% Ni) alloys were compared [3]. Samples with 5-20% nickel alloyed with gold were deposited as a homogenous solid-solution or as a two-phase FCC solid through the modification of annealing procedures. The solid solution is known to be paramagnetic for concentrations below 35% Ni while the two phase solid maintains domains of ferromagnetism within bulk gold. A "flexing" effect associated with the application of an external magnetic field on the two-phase alloy samples illuminates physical mechanisms that correlate with the observed tribo-induced melting temperatures [4].

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[3] Zhenyin Yang; Lichtenwalner, D.J.; Morris, A.S.; Krim, J.; Kingon, A.I, Journal of Microelectromechanical Systems, April 2009, Volume: 18 Issue:2, 287-295.
[4] K. Stevens, L. Pan and J. Krim, (2014) submitted

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