Abstract Submitted
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Quartz Crystal Microbalance Studies of Temperature Rise in a Sliding Contact[1] JACQUELINE KRIM, BENJAMIN DAWSON, MATTHEW WALKER, CHERNO JAYE[2], DOUGLAS IRVING, DONALD BRENNER, North Carolina State University — The exact relation between temperature rise in a sliding contact and frictional energy dissipation is of great technological importance, but poorly understood at a fundamental level. Temperature rise is presumably due to frictional heating that results from phononic and electronic excitations, but efforts to relate temperature rise to friction and sliding velocity have proven very difficult. We have performed QCM studies of adsorbed Krypton monolayers, and also joint QCM-STM studies, to examine temperature rise associated with friction in two well characterized geometries. In the first, we utilized the static phase diagram of two-dimensional Kr adsorbed on graphite as compared to the dynamic phase diagram (with the Kr layer sliding) to determine temperature rise. In the second study, we have recorded frequency shift data for a QCM with indium electrodes in contact with an STM tip while increasing the sliding speed to a point where melting is indicated. A temperature rise on the order of 10 (40-100) degrees is observed in the first (second) geometry. Comparisons to theory yield plausible fit parameters.

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