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New Phenomena in High Temperature Nanofriction on Nonmelting Surfaces: NaCl(100) TATYANA ZYKOVA-TIMAN, DAVIDE CERESOLI, SISSA, INFM, Democritos, via Beirut 2-4, 34014 Trieste, Italy, ERIO TOSATTI, SISSA, INFM, Democritos, ICTP, P.O. Box 586, I-34014 Trieste, Italy — High temperature nanofriction is a difficult and so far unexplored area whwere we made an initial attack by means of simulation. Alkali halide (100) surfaces were chosen as they would not automatically liquefy under a sliding tip, even at temperatures very close to the melting point. We conducted sliding friction molecular dynamics simulations of hard tips on NaCl(100),both in the heavy ploughing, wear-dominated regime, and in the light grazing, wearless regime. Ploughing friction shows for increasing temperature a strong frictional drop near the melting point. Here the tip can be characterized as "skating" over the hot solid, its apex surrounded by a local liquid halo, which moves along with the tip as it ploughs on. At the opposite extreme, we find that grazing friction of a lightly pressed flat-ended tip behaves just the other way around. Starting with an initially very weak low temperature frictional force, there is a surge of friction just near the melting point, where the surface is still solid, but not too far from a vibrational instability. This frictional rise can be envisaged as an analog of the celebrated "peak effect" found close to Hc2 in the mixed state critical current of type II superconductors.

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