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Low-Temperature Nanotribology of Au and Pb using a Quartz Tuning-Fork CARLOS UNTIEDT, GIOVANNI SAENZ-ARCE, Depto. Fisica Aplicada. Universidad de Alicante. — Quartz Tuning-Fork (TF) has been in recent years successfully implemented in force detection schemes for scanning probe microscopy (SPM) applications. Here we report its use as a nanotribometer for measuring friction in atomic size areas. The idea behind such a friction detector, is to take advantage of the large Q-factor of a TF ($Q_{air} \sim 6000$, $Q_{vac} \sim 20000$ at room temperature) which in our set-up depends of the SPM tip-sample dissipative forces. We have measured the Q-factor and the resonance frequency for various TFs. As a first step in the use of a TF as a nanotribometer, we studied the reactive forces that are associated with the combined local elastic properties of the sample and tip and calculated the damping rate associate with changes of the tip-sample distance. Finally, we show the variation of the measured damping rate and local spring constants with tip-sample distances for Au and Pb. For the measurement we have used our TF-nanotribometer at different temperatures ranging from 1.5K to room temperature in high vacuum.

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