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Coherent X-ray Scattering Experiments of Pt (001) Surface Dynamics near Roughening Transition HOYDOO YOU, Argonne National Laboratory, MICHAEL PIERCE, Rochester Institute of Technology, ANDI BARBOUR, VLADIMIR KOMANICKY, DANIEL HENNESSY, Argonne National Laboratory — We will present the results of a series of coherent x-ray scattering temperature dependent experiments from Pt (001) in high vacuum. The resulting speckled diffraction patterns are analyzed with x-ray photon correlation spectroscopy. We find that the hexagonally reconstructed Pt (001) surface exhibits orientational dynamics below 1640 K and a critical behavior as T increases to $T_{\mathrm{R}} = 1834$ K, near the roughening transition as proposed by Abernathy, et al. [Phys. Rev. Lett. **69**, 941 (1992)]. The inverse autocorrelation time constant τ^{-1} of the surface diverges as T approaches T_R. The average integrated intensity remains constant below T_{R} but drops suddenly over a narrow temperature range, indicating abrupt lifting of the hexagonal reconstruction with the roughening transition. This behavior is compared to that of Au (001), for which τ^{-1} approaches a finite value as the reconstruction lifts gradually over a wide temperature range.

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