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SURFACE SPECTROSCOPY USING AN ATOMIC BEAM OF NEUTRAL ATOMS OF VERY LOW ENERGY

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Abstract

By scattering of Ne-atoms of very low energy ($E_{kin} \sim 2.4$ meV) from the (001) face of a LiF crystal information on the dynamics of gas-surface interactions can be obtained. Structures in the intensity distributions of the specular, of the ($\bar{1}\bar{1}$) and (11) beam caused by bound state resonances are observed. Measurements of the temperature dependence of the specular reflected intensity are reported. From these data a surface Debye temperature for LiF is derived. The application of an appropriate Debye model and corrections due to the finite size of the impinging atoms are discussed. The determination of energy and momentum changes during the scattering process by time of flight measurements should enable us to study the annihilation and creation of surface phonons. At surface tenperatures of $T \sim 100$ K elastic scattering is dominant, but a background of diffuse scattered atoms exists.