Atomic scattering from an adsorbed monolayer solid with a helium beam that penetrates to the substrate - DTU Orbit (23/04/2019)

Atomic scattering from an adsorbed monolayer solid with a helium beam that penetrates to the substrate

Diffraction and one-phonon inelastic scattering of a thermal energy helium atomic beam are evaluated in the situation that the target monolayer lattice is so dilated that the atomic beam penetrates to the interlayer region between the monolayer and the substrate. The scattering is simulated by propagating a wavepacket and including the effect of a feedback of the inelastic wave onto the diffracted wave, which represents a coherent re-absorption of the created phonons. Parameters are chosen to be representative of an observed p(1 × 1) commensurate monolayer solid of H2/NaCl(001) and a conjectured p(1 × 1) commensurate monolayer solid of H2/KCl(001). For the latter, there are cases where part of the incident beam is trapped in the interlayer region for times exceeding 50 ps, depending on the spacing between the monolayer and the substrate and on the angle of incidence. The feedback effect is large for cases of strong transient trapping. © 2013 American Institute of Physics.

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