A spectroscopic view of electron-phonon coupling at metal surfaces

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Recent experimental and theoretical advances have made it possible to directly extract from angle-resolved photoelectron spectra the momentum dependent Eliashberg function, α^2F. $F(\omega)$ is the density of phonons and α^2 coupling constant between the electron with momentum k and the phonons. Experimental data for the surface states on two different surfaces of single crystal Be will be compared to recent calculations from the theory group in San Sebastian, Spain. The anisotropic nature of EPC will be illustrated using Be(0001), where the surface state is isotropic, i.e. the Fermi contour is a circle. The EPC as indicated by the mass enhancement varies by about a facto of 4 around this Fermi contour, due to the k dependence of α^2. The requirements on future ARPES beamlines will be discussed in terms of brightness, resolution and time structure.
This work supported by NSF and DoE.