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Low energy alkali ion-surface charge exchange for Si(111) as a function of doping REUBEN D. GANN, JORY A. YARMOFF, University of California, Riverside — Alkali ion-surface charge exchange, which can be used to probe surface electronic states, is well understood within the context of the resonant charge transfer (RCT) model. Recent studies have extended the use of alkali ion scattering and the RCT model from metal surfaces to semiconductors and insulators. In the present work, we measure the effect of doping type and concentration on the neutralization probability of alkali ions scattered from semiconductors. Si(111) surfaces were prepared in UHV, and the neutralization probability of scattered Li^+ ions was measured for projectiles that were singly scattered from Si atomic sites. For the clean Si(111)- 7×7 surface, the neutralization is determined by the surface electronic states [1] and is independent of doping. Samples were then dosed with atomic hydrogen in order to passivate the surface states and unpin the Fermi level. This affects the neutralization probabilities and reveals differences between n and p-type materials.

[1] Y. Yang and J.A. Yarmoff, Phys. Rev. Lett. 89, 196102 (2002).

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