

Surface diffusion of group III and IV metals on Si(100) is studied. Three methods for obtaining diffusion barriers are presented and discrepancies in published results are discussed. Room temperature growth of Al on Si(100) is studied using STM, observing a monomodal scaled island size distribution function. A Kinetic Monte Carlo simulation model is employed to obtain bonding energies and diffusion barriers for Al/Si(100). The best agreement between the measured and simulated characteristics is found for strongly anisotropic diffusion with barriers 0.60 eV in the direction orthogonal to the Si dimer rows and 0.80 eV in the parallel direction. Modifications of the cooling system required for observing metal adatom diffusion on Si(100) using STM are described and the first low-temperature experiment is carried out.