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Studying the surface diffusion of Al on H:Si(100) for STM lithography HYUN-SOO KIM, Univ of Maryland-College Park, A.N. RAMANAYAKA, Joint Quantum Institute, National Institute of Standards and Technology, KE TANG, Univ of Maryland-College Park, J.M. POMEROY, National Institute of Standards and Technology — The surface diffusion of elemental Al on hydrogen passivated Si(100) (H:Si(100)) is studied to identify a process window for acceptor-based nano-devices using scanning tunneling microscope (STM). Previous study and our work on elemental Al show high density of undesirable Al nuclei on hydrogen masking that may cause current paths through the outside of the STM defined regime. The removal of Al nuclei on H:Si(100) by desorbing the hydrogen mask (liftoff) is not successful due to low vapor pressure of Al. In order to fabricate acceptor-based nano-devices with Al using STM lithography, we are examining an alternative approach to reduce the number density of Al nuclei on H:Si(100) surface. We are studying the Al diffusion on H:Si(100) to reduce the number density of Al nuclei by decreasing the Al deposition rate. With low enough density of undesirable Al nucleus on H:Si(100) to isolate STM patterned devices, STM lithography with Al could enable fabrication and study of acceptor-based nano-devices with atomic precision.

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