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Ba termination of Ge(001) studied with STM[1] NEIL CURSON, London Center Nanotechnology, UCL, WOJCIECH KOCZOROWSKI, Poznan University of Technology, TOMASZ GRZELA, IHP, MARIAN RADNY, University of Newcastle, STEVEN SCHOFIELD, London Center Nanotechnology, UCL, GIOVANNI CAPELLINI, IHP, RYSZARD CZAJKA, Poznan University of Technology, THOMAS SCHROEDER, IHP — We use controlled annealing to tune the interfacial properties of a sub-monolayer and monolayer coverages of Ba atoms deposited on Ge(001), enabling the generation of either of two fundamentally distinct interfacial phases, as revealed by scanning tunneling microscopy (STM). Firstly we identify the two key structural phases associated with this adsorption system, namely on-top adsorption and surface alloy formation, by performing a deposition and annealing experiment at a coverage low enough (0.15 ML) such that isolated Ba-related features can be individually resolved. Subsequently we investigate the monolayer coverage case, of interest for passivation schemes of future Ge based devices, for which we find that thermal evaporation of Ba onto a Ge(001) surface at room temperature results in on-top adsorption. This separation (lack of intermixing) between Ba and Ge layers is retained through successive annealing steps up to 770 K with a gradual ordering of the Ba layer at 570 K and above and a decrease in Ba layer density. Annealing above 770 K produces the 2-D surface alloy phase accompanied by strain relief through monolayer height trench formation. At 1070 K the surface morphology changes again but remains a 2-D surface alloy.

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