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**X-ray diffraction analysis of Ge islands on patterned Si(001)** D.A. WALKO, D.A. ARMS, Advanced Photon Source, Argonne National Laboratory, J.T. ROBINSON, O.D. DUBON, LBNL and Dept. of Materials Science and Engineering, University of California-Berkeley, J.A. LIDDLE, Lawrence Berkeley National Laboratory, D.S. TINBERG, P.G. EVANS, Dept. of Materials Science and Engineering, University of Wisconsin-Madison — We have used x-ray diffraction to study the structure of Ge islands grown on patterned Si(001) substrates. Square arrays of submicron Au dots were deposited by electron-beam evaporation through a stencil mask followed by molecular-beam epitaxy growth of Ge. This approach produces Ge islands in the shape of truncated pyramids assembled on a two-dimensional square lattice that extends over thousands of square microns. We have used x-ray diffraction to analyze the structure of the Ge islands, with the x rays focused to illuminate only the patterned regions of the substrate. Structure of the Ge islands was measured as a function of Au dot size, probing the evolution of Si/Ge composition, strain, and orientation with island size. We show that the structure as well as the morphology of the truncated-pyramidal islands is qualitatively distinct from that of dome-shaped islands on the unpatterned regions of the substrate. Supported by US Department of Energy and National Science Foundation.

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