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Evidence for a Large, Thermal-Activated Characteristic Length Scale in Unstable Homoepitaxial Growth on GaAs(001) CHUAN-FU LIN, Department of Materials Science and Engineering, University of Maryland, College Park, HUNG-CHIH KAN, Department of Physics, National Chung-Cheng University, Chia-Yi, Taiwan, R.O.C, S. KANAKARAJU, C.J. RICHARDSON, Laboratory for Physical Science, College Park, MD, RAYMOND PHANEUF, Department of Materials Science and Engineering, University of Maryland, College Park, UNIVERSITY OF MARYLAND TEAM, LABORATORY FOR PHYSICAL SCIENCE COLLABORATION, NATIONAL CHUNG-CHENG UNIVERSITY COLLABORATION — We report on observations of unstable growth on GaAs(001) surfaces nanopatterned with grooves of varying length/width aspect ratios. For homoepitaxial growth at temperatures near 500°, we find that ridges build up at the upper long edges of grooves oriented along [110]. No ridges form at the long edges of grooves oriented [110]; instead cusps form at the bottoms of such grooves. Most interestingly, we find that the evolution of ridge heights during growth breaks into two distinct branches, with the separation occurring at a groove length of 7.5 ± 2.5 μm for growth at 525°, and at a length which is an order of magnitude smaller than this for growth at 460°. These observations indicate the presence of very large, thermally-activated characteristic lengths which governs the evolution of the topography during growth.

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