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The Role of Catalytic Substrate Morphology on the Shape and Domain Size of Two-Dimensional Boron Nitride Sheets MARK GRIEP, U.S. Army Research Laboratory, ROLAND TAY, Nanyang Technological University, TRAVIS TUMLIN, U.S. Army Research Laboratory, EDWIN TEO, Nanyang Technological University, GOVIND MALLICK, SHASHI KARNA, U.S. Army Research Laboratory — Two-dimensional (2D) nanomaterials, including graphene and boron nitride (BN), has been of intense interest in recent years due to their exceptional electronic, thermal, and mechanical properties. Tailoring these novel properties to their maximum potential requires precise control of the atomic layer growth process. In recent years, catalytic growth of 2-D nanomaterials using chemical vapor deposition (CVD) process has emerged as an attractive approach due to their low-cost, scalalibility, and ability totransfer the grown materials on various substrates. In this approach, The the morphology and purity of the catalytic surface plays a critical role on the shape, size, and growth kintectics of the 2D nanomaterial. In this work, we present the results of our systematic studies of the role of catalytic surface morphology on the shape and domain size of CVD grown hexagonal boron nitride (hBN) films. The present work clearly demonstrates that that the presence of surface roghness in the form of ridges leads to a preferential growth of small-domain triangular BN sheets. A 10 to 100-fold reduction in the surfcae roughness leads to increased domain BN triangles, eventually transitioning to large-domain hexagonal shaped hBN sheets.

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