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**Initial Phase of Sub-monolayer Iron Growth on GaN(0001) pseudo-1×1-1+1/12 Surface Studied Using Scanning Tunneling Microscopy and First Principles Theoretical Calculations<sup>1</sup>** WENZHI LIN, NOBORU TAKEUCHI, KANGKANG WANG, ABHIJIT CHINCHORE, MENG SHI, ARTHUR SMITH, Nanoscale and Quantum Phenomena Institute, Department of Physics and Astronomy, Ohio University, HAMAD ALBRITHEEN, Physics and Astronomy Department, King Saud University — Iron/gallium nitride bi-layer structures have potential use for spintronic applications. Therefore, we have carried out an investigation of the initial phase of sub-monolayer iron growth on GaN(0001) pseudo-1×1-1+1/12 surface. To begin with, we verified an atomically smooth GaN growth surface with the assistance of *in situ* reflection high energy electron diffraction. STM shows smooth terraces separated by single and double height bilayer atomic steps. About 0.4 ML iron was deposited on the smooth GaN, and the subsequent STM images reveal Fe islands with a height of  $\sim 2$  Å growing in a two-dimensional step-flow mode outward from the GaN step edges of the pseudo-1x1-1+1/12 surface. A clear  $6 \times 6$  structure is observed for the islands. First principles theoretical calculations are being carried out in order to interpret the experimental results.

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