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Surface Evolution During Sub-Monolayer Manganese Deposition onto Wurtzite Gallium Nitride (000-1) Surface.[1] ABHIJIT CHINCHORE, KANGKANG WANG, WENZHI LIN, JEOHGIHM PAK, ARTHUR R. SMITH, Nanoscale and Quantum Phenomena Institute - Ohio University — While transition metal (TM)-doped gallium nitride (GaN) films have been explored as potential spintronic materials, the structural and magnetic effects of various TM adatoms on GaN surfaces are not well understood. In this work, we investigate the deposition of sub-monolayer quantities of Mn onto the N-polar GaN(000-1) 1×1 surface. First, the GaN surface is prepared by molecular beam epitaxy. The smooth surface is then annealed to remove excess Ga adatoms. Next, the surface is exposed to a dose [approximately 0.05-0.1 monolayer (ML)] of Mn at substrate temperature of 200 ^{o}C. Using *in-situ* reflection high energy electron diffraction (RHEED), we observe the onset of clear 3× periodicity along [1-100] but only 1× along [11-20]. Additional 0.05-0.1 ML Mn doses lead to increasing intensity of the 2/3-order RHEED streaks, while 1/3-order and 1^{st}-order streaks weaken. For Mn doses up to about $1/3^{rd}$ ML, the surface appears quite smooth, with the RHEED pattern stable upon heating the surface to 600 °C. The results suggest a surface evolution process leading to a well-ordered Mn-containing structure at the GaN(000-1) surface.

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