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Structural transition and giant spintronic response of two dimensional Manganese-Gallium $\sqrt{3}\times\sqrt{3}$ R30° surface structure[1] ABHIJIT CHINCHORE, MENG SHI, WENZHI LIN, KANGKANG WANG, Ohio University Nanoscale and Quantum Phenomena Institute, YIANGHAO LIU, Los Alamos National Laboratory, ARTHUR SMITH, Ohio University Nanoscale and Quantum Phenomena Institute, VALERIA FERRARI, ANDREA BARRAL, ANA MARIA LLOIS, Universidad de Buenos Aires and Comision Nacional de Energia Atomica — In recent experiments, we have found that gallium nitride surface when exposed to transition metal atoms, results in novel well-ordered two dimensional spintronic structure, with tunable spintronic properties. A 2000 Å N-polar w-gallium nitride (000$\underline{1}$) layer is grown on a sapphire substrate, by molecular beam epitaxy. The growth is monitored using reflection high energy electron diffraction system. Post growth, the standard 1×1 gallium nitride surface, is exposed to sub monolayer doses of manganese. At low deposition temperature the diffraction patterns show manganese atoms forming a metastable 3×3 structure, on supplying little heat to the manganese 3×3 structure, it undergoes an irreversible transition to form a stable $\sqrt{3}\times\sqrt{3}$R30° structure. Both the structures are studied using a scanning tunneling microscope. The $\sqrt{3}\times\sqrt{3}$R30° structure shows a giant change in spectroscopic response on application of a very small out-of-plane magnetic field. The new findings suggest that the two dimensional magnetic nitride systems have excellent potential for both fundamental investigations and for use in future spintronic devices.

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