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Surface and layered structures of bulk GaN synthesized in a multi-cusp sputter-type ion sourceHenry Ramos¹, Paul Concepcion², Randolph Flauta², Motoi Wada³¹National Institute of Physics, U. Phil., Quezon, Philippines ²Univesity of the Philippines, Quezon, Philippines ³Doshisha University, Kyoto, Japan

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Surface and cross-section characteristics of bulk GaN produced in a multi-cusp sputtering ion source are investigated by field emission scanning electron microscope. Quantitative and elemental analysis is done with an energy dispersive X-ray system. The surface roughness and structure are found to be dependent on the location of the Ga target. A rough surface is observed when the Ga target and sample holder assembly are placed in the middle of the growth chamber. A smoother surface morphology is observed when the sample is placed inside the protection of a magnetic cusp. Huge columnar growth with preferred orientation is observed on cleaved cross-sections. Quantitative point analysis on the cross-sections of bulk samples are conducted to determine regions of stoichiometric GaN and Ga and N rich regions. All samples show that the topmost region is stoichiometric GaN while the lower part of the bulk material consisted of unreacted Ga metal. GaN and Ga dendrites surround the columnar grains and grain boundaries.

Keywords

galium nitride

multicusp ion source

field emission scanning electron microscope

energy dispersive X-ray