Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Photoluminescence of GaN Film Exposed to Chlorine-Containing Plasma DAISUKE OGAWA, YOSHITSUGU BANNO, YOSHITAKA NAKANO, KEIJI NAKAMURA, Chubu University — Gallium nitride (GaN) has been an attractive semiconductor material for the application to not only light emitting diodes, but also high power devices. The advantage of the material is that it can be fabricated to maximize the number density of devices a single wafer. In our current technology, we mainly utilize low-temperature plasma for dry etching. In fact, GaN generally requires chlorine-containing plasma for chemical etching. However, the use of plasma has a drawback that can induce unwanted changes on the fabricating devices in some conditions. This is called as plasma-induced damage (PID). We have so far monitored the development of PIDs with photoluminescence (PL) emitted from the GaN surface during argon plasma process. In this time, we exposed a GaN film to chlorine-containing plasma and monitored the PID development. Our PL measurements show that the chlorine-containing plasma almost gave no change in PL property of GaN, while argon plasma gave drastic changes. This is because the speed of etching by chlorine species was faster than the speed of damage creations by plasma. In this presentation, we will show further results of this experiment along with some analyses for the purpose of industrial application.

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Date submitted: 19 Jun 2015 Electronic form version 1.4