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**DRY ETCHING CHARACTERISTICS OF INGAN USING INDUCTIVELY COUPLED  $\text{Cl}_2/\text{CHF}_3$ ,  $\text{Cl}_2/\text{CH}_4$  AND  $\text{Cl}_2/\text{Ar}$  PLASMAS.**

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In this study, planer inductively coupled  $\text{Cl}_2$  based plasmas were used to etch InGaN and the effects of plasma conditions on the InGaN etch properties have been characterized using quadrupole mass spectrometry(QMS) and optical emission spectroscopy(OES). As process conditions used to study the effects of plasma characteristics on the InGaN etch properties,  $\text{Cl}_2$  was used as the main etch gas and  $\text{CHF}_3$ ,  $\text{CH}_4$ , and Ar were used as additive gases. Operational pressure was varied from 5mTorr to 30mTorr, inductive power and bias voltage were varied from 400W to 800W and  $-50\text{V}$  to  $-250\text{V}$ , respectively while the substrate temperature was fixed at 50 centigrade. For the  $\text{Cl}_2$  plasmas, selective etching of GaN to InGaN was obtained regardless of plasma conditions. The small addition of  $\text{CHF}_3$  or Ar to  $\text{Cl}_2$  and the decrease of pressure generally increased InGaN etch rates. The selective etching of InGaN to GaN could be obtained by the reduction of pressure to 15mTorr in  $\text{Cl}_2/10\%\text{CHF}_3$  or  $\text{Cl}_2/10\%\text{Ar}$  plasma. The enhancement of InGaN etch rates was related to the ion bombardment for  $\text{Cl}_2/\text{Ar}$  plasmas and the formation of  $\text{CH}_x$  radicals for  $\text{Cl}_2/\text{CHF}_3(\text{CH}_4)$  plasmas.