

# 3 - 38 Optical Characteristics of AlN by Irradiated with High Energy $^{238}\text{U}$ Ion<sup>1</sup>

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AlN thin film irradiated with 100 MeV U ions using the HIRFL-SFC (Heavy Ion Research Facility in Lanzhou) facility in Lanzhou were investigated by Infrared spectra, Raman spectra and fluorescence spectroscopes. It appeared  $A_1(\text{TO})$ ,  $A_1(\text{LO})$ ,  $E_1(\text{TO})$  and  $E_2$  Phonon vibration absorption mode to irradiated samples. Fig. 1 showed the FTIR spectra of AlN irradiated with 100 MeV  $^{238}\text{U}$  ions. The Al-N bonds vibration absorption peak is located at  $652\text{ cm}^{-1}$ . With the increase of irradiation dose, vibration absorption band appeared certain broadening phenomena and After irradiation with the  $E_1(\text{TO})$  Phonon vibration absorption peak into one. Transverse optical phonon absorption peak  $E_1(\text{TO})$  for  $670\text{ cm}^{-1}$  also become more and more obvious after irradiation. Irradiation made the Al-N bonds fracture and formed Al-O bonds. Fig. 2 and Fig. 3 demonstrated the Enhance luminous peak after irradiation of AlN. Blue light emission band are related to  $\text{V}_{\text{Al}}\text{-O}_{\text{N}}\text{-3N}$  and  $\text{V}_{\text{Al}}\text{-2O}_{\text{N}}\text{-2N}$  two types of defects and F-type defects aggregation. Green light emission band is due to energy transition emit light of among valence band of Al atoms in the basement.

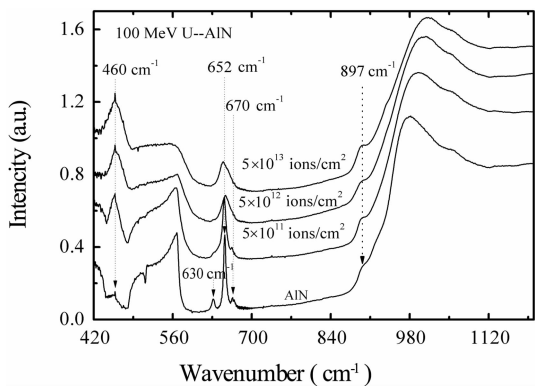


Fig.1 FTIR spectra of AlN irradiated with 100 MeV  $^{238}\text{U}$  ions.

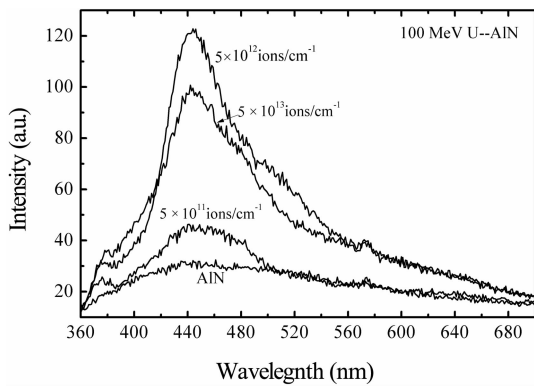


Fig.2 PL spectra of AlN irradiated with 100 MeV  $^{238}\text{U}$  ions.

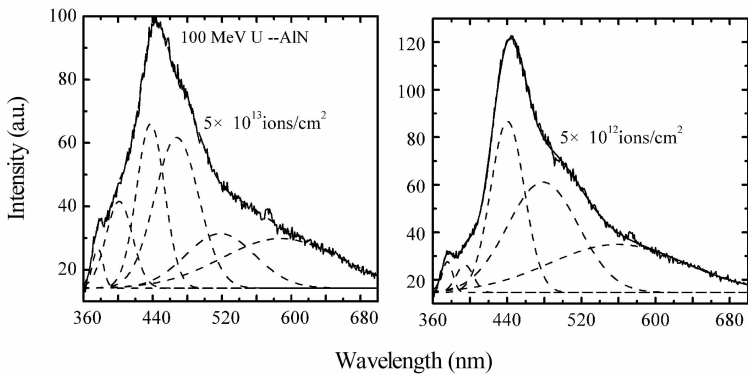


Fig.3 PL spectrum of gaussian function decomposition of AlN irradiated with 100 MeV  $^{238}\text{U}$  ions.

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