



Contribution ID: 14

Type: not specified

Charge states of Fe in AlGaN and AlGaN:Mn

Monday, 15 July 2019 11:15 (15 minutes)

The spectra for Fe implanted AlGaN show the presence of magnetically-split sextets in the “wings”, similar to features observed in GaN and AlN, attributed to Fe³⁺ on Al/Ga sites showing slow paramagnetic relaxations. The central part of the spectra is characterised by paramagnetic Fe²⁺ on Al/Ga sites associated with nitrogen vacancies. However, with Mn doping, the contribution of Fe³⁺ is considerably reduced or negligible. This is coupled with the corresponding emergence of a single line component with Mössbauer parameters typical of Fe⁴⁺ on Al/Ga sites, which are acceptors in AlGaN.

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Session Classification: Nitrides - Results