MOMBE Growth and Optical Properties of Er-doped GaNP

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Abstract

Erbium (Er) doping in GaNP was studied with metalorganic molecular-beam epitaxy. Nitrogen (N) doping in GaP was possible up to 2% and exhibited large bandgap bowing consistent with previous reports. Er was doped in GaNP to study the codoping effect of Er and N. Er concentration was estimated to be above 0.2~0.8% depending on the Er kneudsen cell temperature. Er doping in GaNP showed up photoluminescence (PL) spectra similar to that of GaP in the visible region, but the PL sub-peaks similar to longitudinal-optical-phonon replica expected by the radiative recombinations in GaP exhibited much difference. Broad infra-red (IR) luminesce covering 1.1~1.6μm was observed and was substantially enhanced with the codoping of Er and N. No sharp Er emissions originating from inner-shell 4f-4f transitions were observed. Although the IR-PL was weak and easily saturated in undoped GaNP, it was linearly increased with the excitation level in the Er-doped GaNP.