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Optical and magnetic properties of Tm-doped AlGa_xN alloys N. NEPAL, S.M. BEDAIR, J.M. ZAVADA, Electrical and Computer Engineering, North Carolina State University, Raleigh, NC 27695 USA, N.A. EL-MASRY, Materials Science and Engineering, North Carolina State University, Raleigh, NC 27695 USA, D.S. LEE, A.J. STECKL, Nanoelectronics Laboratory, University of Cincinnati, Cincinnati, Ohio 45221 USA, A. SEDHAIN, J.Y. LIN, H.X. JIANG, Electrical and Computer Engineering, Texas Tech University, Lubbock, Texas 79409, USA — Trivalent RE-ions in AlGa_xN alloys have been shown to emit narrow intra-4*f* transitions over the entire infra red to ultraviolet (UV) spectral range. Also, unpaired 4*f*-electrons of RE ions can align along an easy axis giving magnetic properties to these RE-doped semiconductors. Thulium is one of the RE element which has special optical and magnetic characteristics. We present optical and magnetic properties of Tm doped Al_xGa_{1-x}N ($0 \leq x \leq 1$) alloys grown by solid-source molecular beam epitaxy. Hysteresis measurements on these alloys show ferromagnetic behavior at room temperature. The measured magnetization was strongly dependent upon the Al content and reached a maximum for $x = 0.62$. Previous photoluminescence measurements on these films yielded a blue emission at 465 nm with peak intensity at the same Al content. Our experimental results indicate that both optical and magnetic properties are directly correlated with the alloy compositional fluctuation found in undoped Al_xGa_{1-x}N alloys.

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