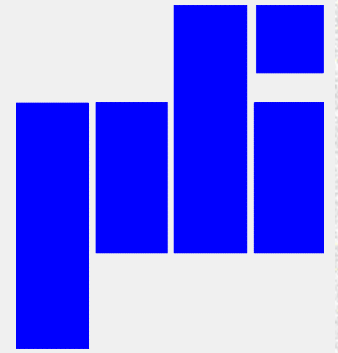




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Colossal magnetic moment of Gd in GaN



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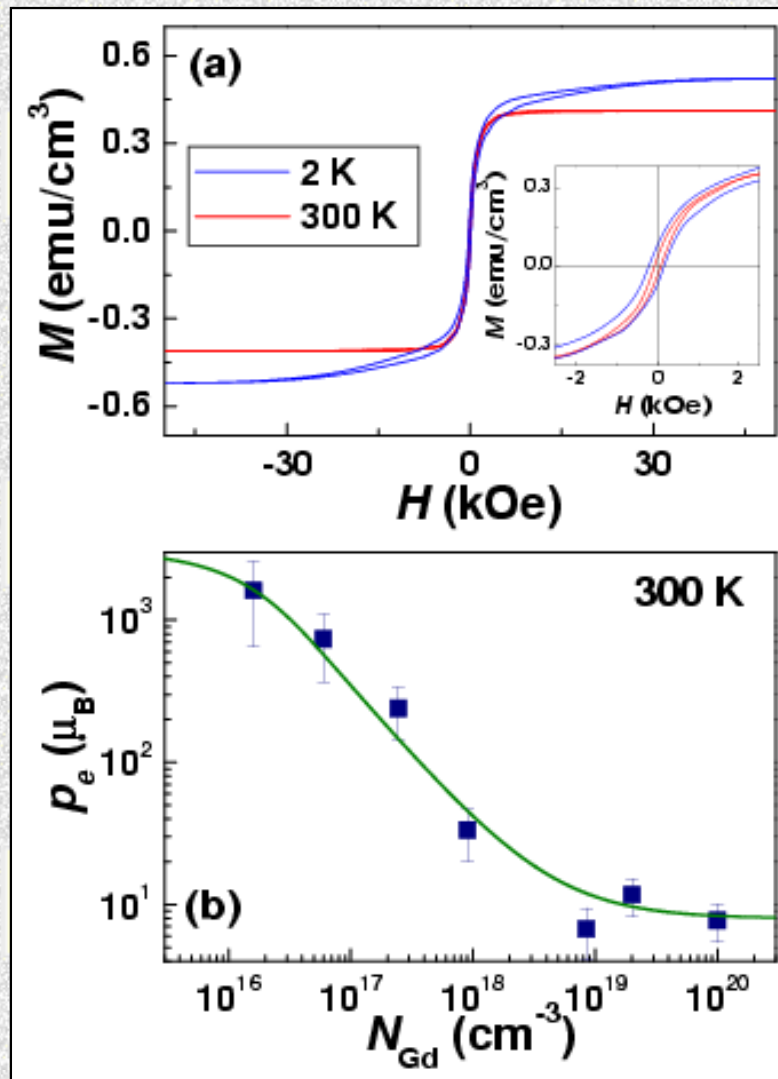
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The magnetic properties of epitaxial Gd-doped GaN layers are investigated as a function of the external magnetic field and temperature. The saturation of magnetization at high fields and the presence of a clear hysteresis at low fields as shown in Fig (a) indicate a ferromagnetic behavior for a Gd concentration of 6×10^{16} cm⁻³. Ferromagnetism above room temperature has been found in all investigated Gd-doped layers with N_{Gd} ranging from 7×10^{15} to 2×10^{19} cm⁻³. The magnetic moment per Gd atom shown in Fig. (b) as a function of N_{Gd} is found to be extraordinarily large ($> 1000 \mu_B$), in particular for low Gd concentrations, while for large values of N_{Gd} it saturates at the atomic moment value of Gd ($8 \mu_B$). In order to account for such a colossal magnetic moment, one has to consider a long-range spin polarization of the GaN matrix by the Gd atoms. GaN:Gd with its T_C above room temperature might thus be very attractive for future spintronics.

[S. Dhar](#), [O. Brandt](#), [M. Ramsteiner](#), [V. F. Sapega](#), and [K. H. Ploog](#), [Phys. Rev. Lett. 94, 037205](#) (2005).

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