

Abstract Submitted  
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**Erbium doped Aluminum Nitride Nanoparticles for Nano-Thermometer Applications**<sup>1</sup> SNEHA G. PANDYA, MARTIN E. KORDESCH, Department of Physics and Astronomy, Ohio University, Athens, OH-45701 — We have synthesized Nanoparticles (NPs) of Aluminum Nitride (AlN) doped *in situ* with Erbium (Er) using the inert gas condensation technique. These NPs have optical properties that make them good candidates for nanoscale temperature sensors. The Photoluminescence (PL) spectrum of Er<sup>3+</sup> in these NPs shows two emission peaks in the green region at around 540 nm and 560 nm. The ratio of the intensities of these luminescence peaks is related to temperature. Using Boltzmann's distribution, the temperature of the NP and its surrounding can be calculated. The NPs were directly deposited on (111) p-type Silicon wafers, TEM grids and glass cover slips. XRD and HRTEM study indicates that most of the NPs have crystalline hexagonal AlN structure. An enhancement of the luminescence from these NPs was observed after heating in-air at 770 K for 3 hours. The sample was then heated in air using a scanning optical microscope laser. The corresponding change in PL peak intensities of the NPs was recorded for laser powers ranging from 0.2-15.1 mW. Temperature calculated using the Boltzmann's distribution was in the range of 320-470 K. This temperature range is of interest for semiconductor device heating and for thermal treatment of cancerous cells, for example.

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