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Change in the Structure and Enhancement of Rare-Earth Emission in amorphous GaN and AlN Thin Films S.B. ALDABERGENOVA, H. MENDEL, H.P. STRUNK, Institut für Werkstoffwissenschaften, Universität Erlangen–Nürnberg, Mikrocharakterisierung, Cauerstr.6, 91058 Erlangen, Germany — We report strong enhancement of Er^{3+}, Ce^{3+} , Tb^{3+}, $Eu^{3+}$and Ho^{3+} emission with annealing in mostly amorphous GaN and AlN thin films prepared by DC magnetron co-sputtering in different laboratories. We observe sharp characteristic emission peaks of intra-4f-shell transitions of Er $^{3+}$, Tb^{3+}, Eu^{3+} and Ho^{3+}ions and a strong but broad peak of 5d-4f emission from Ce^{3+} ions over the temperature range 2-300K. During annealing small crystallites form in the amorphous matrix. The crystallite diameters are between 4 and 7 nm as analyzed by high resolution transmission electron microscopy. We relate strong enhancement of the rare-earth emission with the occurrence of these small crystallites. Different mechanisms of energy transfer from absorbing states in the nanostructured wide band gap GaN and AlN matrix to the rare-earth ions are discussed

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