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Strong non-plasmonic mechanism of light emission from semiconductor quantum well ARKADII KROKHIN, ANTONY LLOPIS, ARUP NEOGI, University of North Texas, SERGIO PEREIRA, Universidade de Aveiro, Portugal, IAN WATSON, University of Strathclyde, UK — We report a new mechanism of enhancement of light emission from InGaN/GaN quantum wells (QW). This mechanism is due to electrostatic attraction of the carriers to gold nanoparticles (NP) imbedded within a QW. Metal equally attracts electrons and holes, causing the carriers to concentrate near its surface. Since the probability of e-h recombination is proportional to carrier densities, the QW with NPs generates a stronger emission than the same QW without the NP. We observed roughly a 60% (80%) enhancement with NPs at room temperature (77K). In these nitride heterostructures, dislocations result in hexagonal pits at the surface. Gold NPs were incorporated inside the pits with no effect on the quality. The same nitride material system used to demonstrate *plasmonic* enhancement [1]. It has been shown that gold film *do not* enhance the emission because of mismatch of surface plasmon energy and the emission energy of the QW. Here we observe the enhancement caused by electrostatic mechanism that does not require energy matching. This mechanism provides another means for enhancing the efficiency of solid- state emitters. This work is supported by the DOE grant # DE-FG02-06ER46312.

[1] K.Okamoto, *et al.*, *Nature Mat.* **3**, 601 (2004).

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