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Enhanced light emission via plasmonic and non-plasmonic effects in metal ion-implanted Silicon AKHILESH SINGH, KAROL GRYCZYNSKI, ARKADII KROKHIN, FLOYD MCDANIEL, ARUP NEOGI, University of North Texas, Department of Physics, Denton, TX, USA — We have observed enhanced photoluminescence from metal implanted nanoscale Silicon light emitters. Low energy (30 keV) Au and Ag metal ions were implanted in crystalline silicon to achieve non-plasmonic and plasmonic enhancement of light emission over a broad spectral range. The emission in the UV region can be significantly enhanced by the surface plasmon (SP) induced radiative recombination process. The recombination of carriers in Si bound exciton is also influenced by transverse optical phonon due to the polarization of the surface of bound exciton complex. The recombination life time of the electron-hole pair as estimated from the time resolved PL measurement changes from $\sim$ 2 ns to 400 ps in the presence of Ag ion induced SP polaritons. The non-resonant emission can be enhanced by electrostatic-image charge effects. The emission in the visible (570 nm) and UV (370 nm) wavelength range can also be significantly enhanced by electrostatic image charge effects induced by Au nanoparticles

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