Nanograting for lasing action and sensing.
Montacer Dridi, Florent Colas, Chantal Compère
LDCM
Unité Recherches et Développements Technologiques
IFREMER - Centre de Brest

Abstract: One of the most exciting and recent use of metallic nanograting is as a plasmon laser. Such laser has been demonstrated recently theoretically and experimentally at room temperature.1,2,3 In this conference we will present our latest results on Plasmon based laser. We will investigate the near field properties of the demonstrated plasmon-based laser. We demonstrate that due to the coupling between gain molecules (Rhodamine) and a lattice plasmon mode we could achieve a much higher enhancement of electromagnetic field as compared to the passive structure (no gain media) (Figure 1). We will demonstrate that the near field enhancement in such laser has a non linear behavior as a function of the pumping rate. We will discuss the application of such properties in sensing.

Figure 1: Plasmon-based laser: Optically pumped, 2D arrays of plasmonic Au nanoparticles surrounded by an organic gain medium exhibits a high enhancement field above the threshold of lasing (log scale).