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Plasmonic properties of Al nano-concave arrays

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Surface plasmons (SPs), excited by the interaction between light and metal surfaces have attracted great scientific interest due to their ability to enhance light emission from solid-state materials. Among metals used in surface plasmon coupled luminescence, Al gains increasing attention owing to its advantageous plasmonic properties in the UV region related to a small imaginary part of its relative permittivity at the UV wavelength range, low cost and abundance. In this talk, plasmonic properties of regular arrays of Al nano-concaves with various pitch size prepared by anodization of Al, will be presented. As a proof of concept, the enhancement of UV emission from ZnO thin films deposited on the Al nano-concave arrays and the modulation of the enhancement factor by the distance between the Al nano-concave centers will be shown. Zinc oxide (ZnO), with a wide direct band gap (3.37 eV) and a large exciton binding energy (60 meV), has been considered as a promising candidate for efficient ultraviolet (UV) light-emitting devices (LEDs) and low threshold UV lasers. For photonic applications of ZnO it is of outmost importance to obtain highly efficient UV emission from the near band edge (NBE). Plasmonic enhancement of the UV emission by Al nanostructures is a promising way to achieve this goal.

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