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Nanowire-plasmonic photocatalysts and thermal emitters

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Abstract

Optical absorption enhancement using plasmonic structures enables a wide range of applications such as solar energy harvesting devices, light emitting devices and photothermal management. For example, in plasmonic photocatalysis, it has recently attracted great interest in enhancing photocatalytic efficiency not only by the plasmon-enhanced near field but also by the plasmon-enhanced hot-carrier injection, which could boost the visible response of wide bandgap photocatalysts [1]. Here we report measurements and simulations of the efficient sunlight-driven and visible-active photocatalysts composed of plasmonic metals and ZnO nanowire (NW) arrays fabricated via an all-wetchemical route (Figure 1a) [2]. Another application of plasmon-enhanced light absorption is the perfect absorber and thermal emitter [3]. It is found that with proper designs supported by the electromagnetic simulation, the plasmonic structures could exhibit near perfect absorption at desired resonant wavelengths, making them promising for a number of potential application such as thermal emitters (Figure 1b) [4], molecular sensors [5] and IR sensors [6].

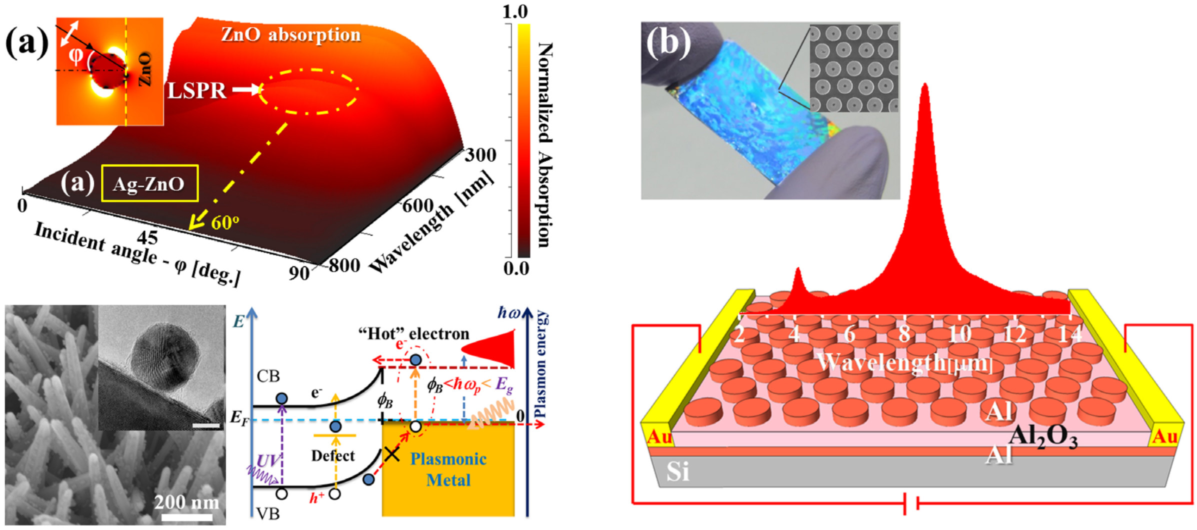

Figure 1. (a) Plasmon-mediated photocatalytic activity of ZnO NWs. (b) Plasmonic absorbers for thermal emitters.

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