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Field enhancement by Plasmonic Nanostructures¹

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Plasmonics is a fascinating research theme undergoing rapid evolutions in recent years that focus on the study of light interaction with metallic nanostructures involving collective electron oscillations (plasmon). An exciting goal of plasmonics is to develop fully integrated electro-optical nano-circuits in which photonics and electronics merge at nanoscale dimensions. Field localization, i.e., strongly enhanced optical hot spots in nanoscale near nanostructures, is one of the key features in light interaction with plasmonic nanostructures. In this talk, I will discuss the nanoscale hotspots induced by light interaction with several different types of plasmonic nanostructures such as isolated/chained nanoparticles, tips, and nanowires. Besides the intensity field information, I will also present the energy flows information of the hotspots (Poynting vector) which illustrates the formation of field enhancement effect in a more intuitive manner. Many interesting energy flows such as saddle, centre and vortex flows are seen in the near-field of the plasmonic nanostructures. Lastly, I will briefly discuss the possible thermal influence of these hotspots on the performance and operation of future integrated plasmonic/electronics nano-circuits.

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