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Nano-optics in flatland

Abstract

A promising alternative that circumvents the fundamental diffraction limit of light is provided by the excitation of surface plasmon polaritons (SPPs) or surface phonon polaritons (SPhPs) –surface waves originated by coupled excitations of photons and mobile/bound charges in metals/polar materials, respectively- and their ability to enhance and confine optical fields into deeply sub-diffracting volumes[1-3]. In this direction, the advent of two-dimensional (2D) materials[4] supporting SPPs or SPhPs with fascinating properties[5], has introduced a very encouraging arena for scientifically ground-breaking discoveries in 2D nano-optics. Here, I will show you recent results on the demonstration of first proof-of-concept devices in 2D nano-optics[6,7] (Fig. 1 and Fig. 2) exploiting the excitation of graphene SPPs or h-BN SPhPs.

References

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Figures

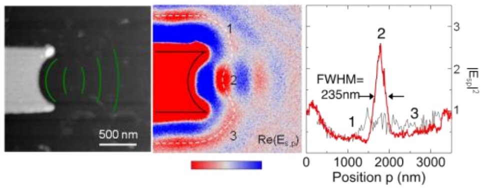

Figure 1: Launching and focusing of graphene SPPs with an Au nanoantenna. Left: topography of an Au nanoantenna with a concave ending. Middle: near-field image showing the fields on the antenna and the graphene plasmons being focused. Right: profile along the dashed with line in the near-field image showing the enhancement of the fields at the focus.

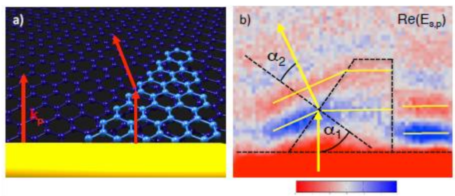

Figure 2: a) Illustration of a graphene bilayer prism next to an Au antenna. b) Near-field image of graphene SPPs refracting at a graphene bilayer prism. The yellow lines and arrows illustrate the plasmon wavefronts and their refraction.