



Exploiting the concept of effective media to manipulate surface plasmons without dielectrics.

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In recent decades, research into the control and manipulation of surface plasmon polariton (SPP) propagation has expanded quickly due to their potential in a number of applications such as focusing devices [1–2], sensors [3] and nanoantennas [4–5]. Several techniques have been developed capable of arbitrarily tailoring the SPPs propagation. This includes the use of cuboids [6–7], micro-disks [8] and SP graded-index steerers [9]. Frequently, these methods exploit the concept of effective media. For SPPs, the simplest configuration to exploit this concept is by placing a block of dielectric onto the surface of a semi-infinite metal which creates an effective refractive index (n_{eff}). We can achieve a desirable response by properly designing the dielectric block, tailoring the profile and height as desired, enabling the focusing or steering of SPPs.

Inspired by the great technological potential that the arbitrary manipulation of SPPs offers, we propose an alternative route to such control. We manipulate the propagation of SPPs using only metallic interfaces to produce ultra-compact plasmonic devices, opening up a range of new opportunities for potentially recyclable plasmonic devices [10]. We use a semi-infinite substrate made of rhodium (Rh) and insert a metallic block of silver (Ag) to focus incident SPPs onto a single focal spot. We will discuss results further and forecast possible future research and applications at the conference.

References

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