

Abstract Submitted
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Propagation of Surface Plasmon Polaritons in Thin Films of Topological Insulators¹ YURY DESHKO, ZHIYI CHEN, LIA KRUSIN-ELBAUM, VINOD MENON, City College of New York – CUNY, JACOB TREVINO, Advanced Science Research Center – CUNY, ALEXANDER KHANIKAEV, Queens College – CUNY — Surface Plasmon Polaritons (SPP) are coupled collective oscillations of surface charges and electromagnetic waves confined to the interface between a metal and a dielectric. Three dimensional topological insulators (TI), such as Bi_2Se_3 , Bi_2Te_3 , and Sb_2Te_3 are narrow band-gap semiconductors in the bulk while having conducting surface with the linear energy dispersion for the surface electronics states. Similar to double-layered graphene a thin single film of TI supports two SPP modes in the far-infrared range. We study the propagation of these modes in thin films of Bi_2Se_3 , Bi_2Te_3 , and Sb_2Te_3 . The dispersion curves and the propagation lengths are estimated for all three materials. The explanation of the discrepancy between the theory [1] and the first experimental observation of standing wave SPPs in Bi_2Se_3 [2] is proposed. Finally, the possibilities of tuning the SPP dispersion relations in thin films of TI are discussed.

[1] T. Stauber, G. Gomez-Santos, and L. Brey, Phys. Rev. B 88, 205427 (2013).

[2] P. Di Pietro, M. Ortolani, O. Limaj, A. Di Gaspare, V. Giliberti, F. Giorgianni, M. Brahlek, N. Bansal, N. Koirala, S. Oh, P. Calvani, and S. Lupi, Nature Nanotechnology 8, 556 (2013).

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