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Experimental demonstration of TE-excited surface plasmon polariton wave LIANG FENG, AMIT MIZRAHI, ZHAOWEI LIU, VITALIY LOMAKIN, YESHAIAHU FAINMAN, University of California, San Diego — Plasmonics, as the most rapidly developing subject in nanophotonics and nano-scale optoelectronics, is finding ample applications ranging from bio-imaging, sensing, solar cell to chip scale optoelectronic integration. However, the inherent polarization feature of surface plasmon polariton (SPP) dictates that it can only be excited by incident light with TM polarization, thus limiting the excitation efficiency to 50% at most if the incident light is unpolarized. Here, we propose a novel plasmonic nanostructure that can overcome this inherent limitation for SPP excitation. The proposed structure supports highly efficient SPP-TE coupling, due to an excited hybrid mode inside the plasmonic structure. This unique TE-excited SPP was successfully verified both in numerical simulation and in experiment using the Kretschmann configuration as a sharp dip was identified in the reflection spectrum, consistent with our theoretical prediction. Furthermore, we show that SPPs could be simultaneously excited with both TE and TM polarization and thus the excitation efficiency could approach 75%.

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