硅基表面等离子激元器件
Silicon-based Surface Plasmon Polaritons Device

Introduction

Surface Plasmons, which are propagating along a metal-dielectric interface with an exponentially decaying field in both sides, have been considered as energy and information carriers to overcome the diffraction limit of light in conventional optics. In our two papers, an ultracompact wavelength demultiplexing structure based on arrayed plasmonic slot cavities and a narrow band-pass plasmonic filter based on a slot cavity are proposed and analyzed by using the finitedifference time-domain (FDTD) method.

Plasmonic slot cavities

Here, A compact wavelength demultiplexing structure based on arrayed metal-insulator-metal (MIM) slot cavities is proposed and demonstrated numerically.

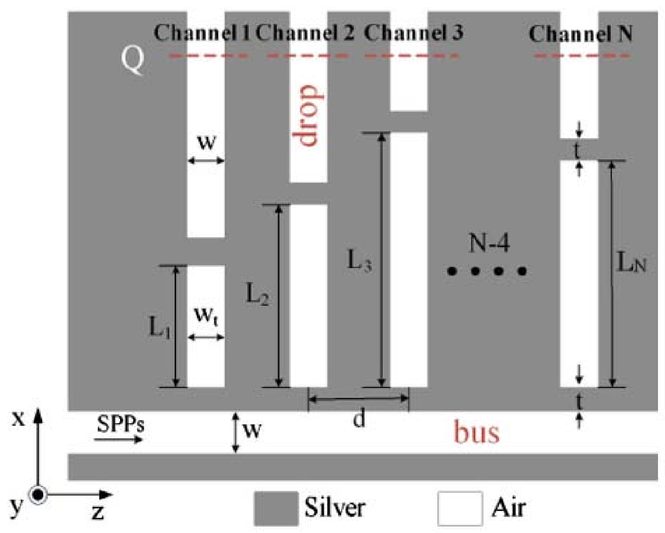

Fig. 1 Schematics of plasmonic slot cavities.

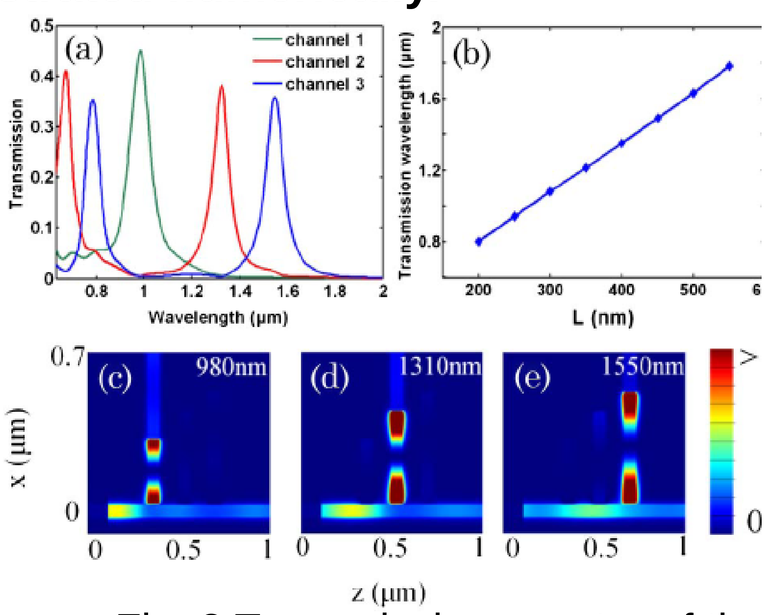

Fig. 2 Transmission spectra of the proposed demultiplexing structure.

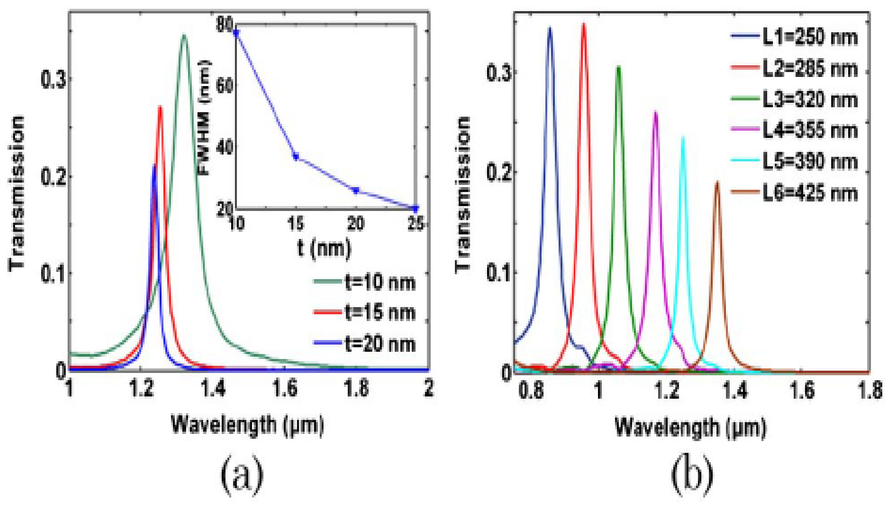

Fig. 3 Transmission spectra of the drop waveguide at various coupling distances.

Band-pass plasmonic slot filter

An ultra-compact surface plasmon polaritons (SPPs) narrow band-pass filter based on a slot cavity is proposed and numerically investigated. Attributed to the coupled resonances in the cavity, the filter demonstrates pass-band selection capability.

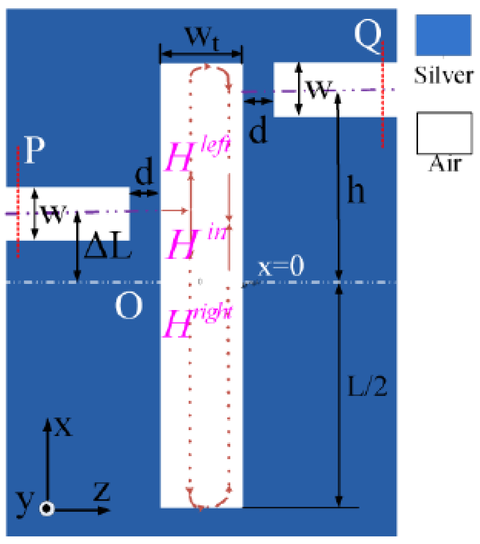

Fig. 4 Schematic of the plasmonic slot filter.

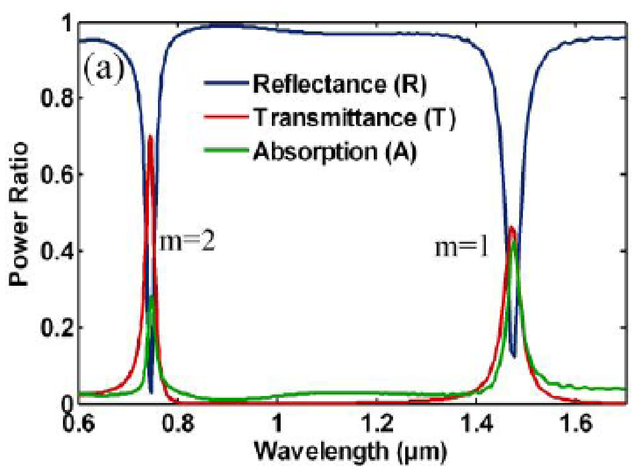

Fig. 5 (a)The spectra of the transmission of the plasmonic slot filter.

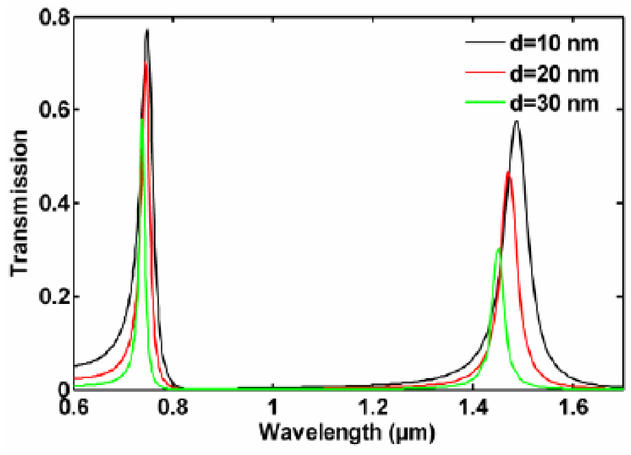

Fig. 6 Transmission spectra of the proposed filter.

Conclusion

1. In the proposed structure, every slot cavity can capture the evanescent fields of SPPs propagating along the bus waveguide and act as a plasmonic resonator.

2. Several adjustable parameters have been investigated to flexibly modify the filtering characteristics of the proposed plasmonic filter.

Publication

F. F Hu, et. al. Opt. Lett, *36*, 1500 (2011).

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