Planar transport of subwavelength magnetic localized surface plasmons modes

Yujiao Liao, Hongmei Ye, Kui Han, Weihua Wang, Xiaopegn Shen*
College of Physical Science and Technology
China University of Mining and Technology
Xuzhou, China
*xpshen@cumt.edu.cn

***Abstract*—Planar coupling between two ultrathin metallic spiral structures (MSS) and magnetic coupling energy transport along MSS chains are theoretically, numerically and experimentally demonstrated at microwave frequencies. Coupled mode theory is adopted to analyze the coupling mechanism. Then near-field response spectra and near-field pattern are measured in the microwave regime to proof the electromagnetic properties. We also show that the bending plasmons waveguide is able to support magnetic plasmon propagation, and was not affected by the bending corner. Finally, beam splitter and MZ interferometer are proposed based on the magnetic resonator chains. Experimental results at the microwave frequencies have been conducted to verify these plasmonic devices, which show great agreements with the simulation results.**

Keywords—localized spoof surface plasmons (LSSPs)

REFERENCES

[1] X. Shen, and T. J. Cui, "Ultrathin plasmonic metamaterial for spoof localized surface plasmons", Laser & Photonics Reviews. Vol. 8, pp. 137-145, 2014.

[2] P. A. Huidobro, E. Moreno, L. Martin-Moreno, and F. J. Garcia-Vidal, "Magnetic localized surface plasmons", Phys. Rev. X. vol. 4, pp. 340-342, 2014.

[3] Z. Gao, F. Gao, and Y. Zhang, "Complementary structure for designer localized surface plasmons", Appl. Phys. Lett. vol. 107, pp. 30-61, 2015.

[4] M. Quinnine, A. Leitner, J. R. Krenn, and F. R. Aussenegg, "Electromagnetic energy transport via linear chains of silver nanoparticles", Opt. Lett. vol. 23, pp. 1331, 1998.

[5] H. Liu, D. A. Genov, D.M.Wu, Y. M. Liu, J. M. Steele, C. Sun, S. N. Zhu, and X. Zhang, "Magnetic plasmon propagation along a chain of connected subwavelength resonators at infrared frequencies" Phys. Rev. Lett. vol. 97, pp. 243902, 2006.