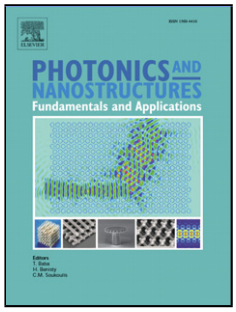
Accepted Manuscript




Title: Tunable Fano resonance and high-sensitivity sensor with high figure of merit in plasmonic coupled cavities

Authors: Yan Deng, Guangtao Cao, Hui Yang

PII: S1569-4410(17)30170-0
DOI: https://doi.org/10.1016/j.photonics.2017.11.008
Reference: PNFA 622

To appear in: *Photonics and Nanostructures – Fundamentals and Applications*

Received date: 2-6-2017
Revised date: 23-9-2017
Accepted date: 21-11-2017

Please cite this article as: Yan Deng, Guangtao Cao, Hui Yang, Tunable Fano resonance and high-sensitivity sensor with high figure of merit in plasmonic coupled cavities, Photonics and Nanostructures - Fundamentals and Applications https://doi.org/10.1016/j.photonics.2017.11.008

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

# Tunable Fano resonance and high-sensitivity sensor with high figure of merit in plasmonic coupled cavities

Yan Deng[1]*, Guangtao Cao[1,2], Hui Yang[2,3]

[1] College of Physics, Mechanical and Electrical Engineering, Jishou University, Jishou 416000, China
[2]National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, 500 Yu Tian Road, Shanghai, 200083, China
[3] University of Chinese Academy of Science, No.19 A Yuquan Road, Beijing 100049,China
* yanzi1232@126.com

HIGHLIGHTS

- The coupled cavities are taken as a composite cavity to explain the origin of Fano resonance.
- 2 A dynamic theory is proposed and agrees well with the numerical method.
- The detection sensitivity of the plasmonic structure reaches $1.103\times10^{8}$.
- The figure of merit (FOM) of the plasmonic sensor approaches $2.33\times10^{4}$.
- The influences of system parameters on Fano resonance profiles are investigated thoroughly.

**Abstract:** Actively tunable sharp asymmetric line shape and high-sensitivity sensor with high figure of merit (FOM) are analytically and numerically demonstrated in plasmonic coupled cavities. The Fano resonance, originating from the interference between different light pathways, is realized and tuned in on-chip nanostructure composed of metal-dielectric-metal (MDM) waveguide and a pair of cavities. To investigate in detail the Fano line shape, the coupled cavities are taken as a composite cavity, and a dynamic theory is proposed, which agrees well with the numerical simulations. Subsequently, the sensing performances of the plasmonic structure is discussed and its detection sensitivity reaches$1.103\times10^{8}$. Moreover, the FOM of the plasmonic sensor can approach $2.33\times10^{4}$.

Download English Version:

https://daneshyari.com/en/article/7932795

Download Persian Version:

https://daneshyari.com/article/7932795

Daneshyari.com