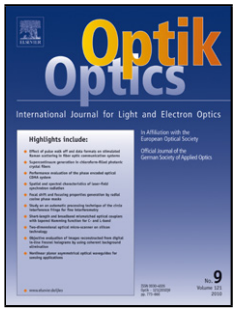
Accepted Manuscript



Title: SPP waveguide of CdS nanowires and graphene nanobelts

Authors: Jun Zhu, Zhengjie Xu, Wenju Xu, Deli Fu, Duqu Wei

PII: S0030-4026(17)31282-2
DOI: https://doi.org/10.1016/j.ijleo.2017.10.069
Reference: IJLEO 59805

To appear in:

Received date: 21-7-2017
Accepted date: 13-10-2017

Please cite this article as: Jun Zhu, Zhengjie Xu, Wenju Xu, Deli Fu, Duqu Wei, SPP waveguide of CdS nanowires and graphene nanobelts, Optik - International Journal for Light and Electron Optics https://doi.org/10.1016/j.ijleo.2017.10.069

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

SPP waveguide of CdS nanowires and graphene nanobelts

Jun ZHU †[1,2] , Zhengjie Xu[1], Wenju Xu[1,2] , Deli Fu [1], Duqu Wei[1]

(1 College of Electronic Engineering,Guangxi Normal University,Guilin 541004,China;

2Guangxi Key Laboratory of Automatic Detecting Technology and Instruments,Guilin University of Electronic Technology, Guilin, 541004, China)

† Corresponding Author e-mail：zhujun1985@gxnu.edu.cn

Abstract: Graphene has potential to replace germanium as compound semiconductor for high-performance devices because of its unique optoelectronic properties and availability of existing integrated circuit manufacturing technology. This study investigates surface plasmon polariton (SPP) waveguide-based interaction between CdS nanowires and graphene nanobelts to determine shortcomings of the existing technology. The structure uses MgF_2 as cladding, which symmetrically covers CdS nanowires and graphene nanobelts. An air gap of same width is etched in middle of CdS nanowires and graphene nanobelts. SPP is optically excited. Gain compensation is obtained through coupling effect of nanowires, capacitance-enhanced effect of air gap and GaAs semiconductor material, and low refractive index of buffer layer to reduce transmission loss. The structure can achieve strong photon localization and easily implement low threshold for nanometer laser. Experiments on characteristics of SPP show that increasing air gap width of structure reduces transmission loss and increases limiting factors. Limiting factor of waveguide structure is less than 0.15, which indicates ultra-deep subwavelength constraints. SPP waveguide can be integrated with various nanophotonic and electronic devices and has broad application prospects in optical sensing, optical communication, and other fields.

Key words: Graphene; Nanowires; Surface plasmon polariton; Coupling

Download English Version:

https://daneshyari.com/en/article/7224996

Download Persian Version:

https://daneshyari.com/article/7224996

Daneshyari.com