

光学元件与制造

基于表面等离子体激元效应的可调制滤波器

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摘要:

针对常用的光学滤波器滤波波长不可变的特点, 提出一种利用表面等离子体激元效应实现可调制滤波的方法。该方法根据金属邻近电介质的介电常数发生改变时, 金属与入射光波的表面等离子体激元耦合共振模式发生改变, 以此实现滤波波长调制。在加工有亚波长纳米孔阵列的Au薄膜上制作了一可见光滤波器, 实验中采用空气、酒精和油作为介质对器件进行调制。结果表明: 相对于常用的光学滤波器, 该器件由于可以方便地改变临近介质的介电常数, 因此具有滤波波长连续可调、快速方便、波长变化精度高等特点。

关键词: 表面等离子体激元 调制滤波器 电介质 纳米孔阵列

Modulated filter based on surface plasmon polariton

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Abstract:

Since the wavelength feature of an optical filter is fixed once it is made, surface plasmon polariton on a flat metal-dielectric interface is used to make a modulated filter. When light beam is focused on the metal-dielectric interface, the surface plasmon polariton (SPP) of metal-dielectric will be changed to modulate the wavelength of the filter by modulating the dielectric index of the dielectric layer. A modulated optical filter is fabricated on an Au film with a set of sub-wavelength nanometer hole arrays. In the experiment, air, alcohol and oil are selected as dielectric layers to test the filter. Unlike the conventional optical filter, this filter can be modulated continuously and conveniently.

Keywords: plasmon polariton modulated filter dielectric nanometer hole array

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