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现代应用光学

光栅耦合的可集成表面等离子体激射装置

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摘要：　为了能够更有效地调节和产生表面等离子体激元(Surface Plasmon Polaritons,SPPs)的激射,设计了一种光栅耦合的可集
射装置,利用电子束激发和光栅耦合方式实现了SPPs在无源金属层中的传播和激射。分析了该装置SPPs传播的波矢特性,通过某一条件
条件和光照波长的分析得出了结构的一般特性。结果表明:基于光栅耦合结构的装置产生的SPPs激射具有显著的强局域特性,通过控制
束强度可有效调节SPPs的激射,该装置可在光照波长710 nm左右的可见光范围实现有效的SPPs传播。该装置的研制对于构建等离子
路,探测纳米线结构和纳米级飞秒光场极有意义。

关键词：　等离子体物理学　表面等离子体激元　光栅耦合　强局域化

Integrated device of lasing SPPs with coupling grating

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Abstract: To control the lasing of Surface Plasmon Polaritons (SPPs) more effectively, an integrated device of la
SPPs based on a coupling grating was researched and the propagation and lasing of the SPPs in passive meta
were realized by electron beam exciting and grating coupling. The characteristics of wave vector for the SPPs
propagation were analyzed and the general characteristics of the device were obtained through the analysis c
condition and light wavelength under a special condition. Results indicate that the device to complete the SPPs
based on the coupling grating has an obvious strong local characteristics, and it can control the lasing SPPs eff
by adjusting the intensity of injecting electron beam. The device can propagate the SPPs well when it is in the
visible light wavelength. The device has a positive significance for researching the construction of plasmon cell c
the detection of nano-wire structure and the explosion of nano-optical field.

Keywords: plasmon physics　Surface Plasmon Polaritons(SPPs)　coupling grating　strong localization

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