



## 器件制备及器件物理

### 外腔反馈对量子点激光器输出特性的影响

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**摘要：**在对光栅外腔量子点激光器进行理论研究的基础上,分析了外腔反馈对Littrow型光栅外腔量子点激光器输出功率、调谐范围等输出特性的影响,发现器件参数的选择对外腔激光器的性能影响很大。对外腔激光器的输出功率和调谐范围进行了理论计算,并与实验结果进行了对比。计算得到的外腔激光器的输出功率与实验结果符合得很好,忽略了非线性增益相关的增益抑制的单模调谐范围理论计算值稍小于实验结果。

**关键词：**量子点激光器 外腔反馈 输出功率 调谐范围

本刊中的类似文章

## Influence of External Cavity Feedback on The Output Characteristics of Quantum-dot Lasers

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**Abstract:** External-cavity lasers (ECLs) play an essential role in numerous areas such as optical telecommunication, environment monitoring, medical treatment, and spectroscopy. Due to unique features of the quantum dot material, *i.e.*, low density of states and broad gain profile, quantum dot lasers are really suitable for high performance ECLs. The frequency stability and the linewidth can be improved by using an external cavity. However, optical feedback may cause instabilities. It is important to know the characteristics of a semiconductor laser with external optical feedback in such systems. The common Littrow-type external cavity laser contains a collimating lens and a diffraction grating as the end mirror. The first-order diffracted beam provides optical feedback to the laser diode chip, and the emission wavelength can be tuned by rotating the diffraction grating. In this paper, the theory of grating external cavity quantum dot lasers is discussed. The influences of external cavity feedback on output power and maximum tuning range of the Littrow-type external cavity quantum dot laser are analyzed. Device parameters have a significant impact on the external cavity laser performance. Output power and tuning range of external cavity quantum dot lasers are numerically simulated and compared with the experimental results. The theoretical results of output power agree well with the experimental data, and the tuning range value is slightly less than the experimental results without considering the suppression relative to nonlinear gain.

**Keywords:** quantum dot laser external feedback output power tuning range

收稿日期 2012-12-18 修回日期 2013-01-25 网络版发布日期 2012-12-31

基金项目:

国家自然科学基金(60976015,61176065); 山东省自然科学基金 (ZR2010FM023); 信息功能材料国家重点实验开放课题资助项目

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