掺 Yb 双包层光纤激光器的研究

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摘要：本文研究了以国产 974nm 半导体激光器作为泵浦源、掺 Yb 双包层光纤作为工作物质、以光纤光栅和二色镜组合为谐振腔的光纤激光器。首先，为了解决泵浦光的光束改善，讨论了不同透镜组合构成的耦合系统的耦合效率；然后，为了获得更大的输出激光功率，进行了不同方案的尝试，通过改变腔镜透过率和光纤长度来确定最佳实验方案。重点分析了在不同泵浦功率下，荧光光谱的输出功率、谱峰波长、谱宽随泵浦功率的变化以及输出激光的光谱特性。实验结果表明，光纤长度较、后腔镜对激光透过率较大时获得的激光输出更大，激光的中心波长与光纤光栅的反射中心波长相同。

关键词：光纤激光器；掺 Yb 双包层光纤；耦合效率

Research on Yb-doped double-cladding fiber laser

Abstract: The Yb-doped double-cladding fiber laser which consists of an internal diode laser as the pump source with output wavelength of 974nm and a fiber Bragg grating at fiber’s one end and a reflector at the other end was studied in detail. Firstly, the coupling system was discussed for high coupling efficiency. Secondly, the characteristics of the fluorescence emission and the laser emission were investigated. The result shows that the laser output is higher with longer fiber and higher transmission of the end mirror. Lastly, the limitation of this experimental system and its improvements were analyzed.

Key Words: fiber laser; Yb-doped double-cladding fiber; coupling efficiency

教师点评：论文研究了以国产 LD 为泵浦源、掺 Yb 双包层光纤为工作物质、以光纤光栅和二色镜组合为谐振腔的光纤激光器。通过对掺 Yb 光纤激光特性的实验研究，了解了光纤激光器的工作原理，掌握了从事光纤研究的基本的实验方法。实验工作能力强，对实验中出现的问题能积极思考，对实验现象能进行一定的分析。论文工作量大，思路流畅，条理清楚，是一篇优秀论文。