以雷射剝離法研製淡化銦鎵垂直共振腔發光二極體

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摘 要

目前垂直共振腔發光二極體主要應用於短距離資料傳輸的塑膠光纖上，原因在於垂直共振腔發光二極體有著較傳統發光二極體半高寬窄、指向性佳、以及發光效率高等之優點。垂直共振腔發光二極體結構組成主要由有機金屬化學氣相沉積系統成長氮化銦鎵/氮化鎵多重量子井層，並介於兩面反射率各為85%(5對)與99.9%(7.5對)之介電質(TiO2/SiO2)分佈式布拉格反射鏡之間，且在我們欲製作之波段525nm左右，有很寬之高反射率截止區(Stopband)。實驗結果顯示，在20 mA直流電流注入下，垂直共振腔發光二極體與傳統發光二極體之起始電壓值幾乎相符各為4.55V與4.45V。在525 nm的垂直共振腔發光二極體有較穩定之發光波長，由於電流密度增加時有較少的熱效應因而紅移量減少，且共振腔模態之半高寬為5.5 nm較傳統發光二極體之指向性更好，發光波長之半高寬由48降為35 nm，並得到約為100之品質因數。垂直共振腔發光二極體之電激發光譜有較強的光輸出，這是由於共振腔的影響之故，並且由不同角度之電激發光分析量測中證明發光方向有獲得改善。

關鍵詞 : 氮化鎵、氮化銦鎵、垂直共振腔發光二極體

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