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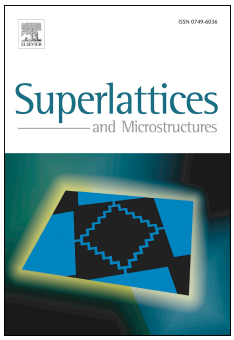

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Optimization design and preparation of near ultraviolet AlGaN/GaN distributed Bragg reflectors

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Abstract

In this paper, near-ultraviolet AlGaN/GaN distributed Bragg reflectors (DBRs) are designed by the optimization of refractive index contrast (△n/n) and prepared by metalorganic vapor phase epitaxy. The relationship between refractive index contrast and Bragg wavelength for $Al_{0.2}Ga_{0.8}N$/GaN DBRs are analyzed theoretically. Through the calculation, it is found that the refractive index contrast, the reflectivity and the stopband of DBRs are the function of Bragg wavelength. According to the calculation results, $Al_{0.2}Ga_{0.8}N$/GaN DBRs with Bragg wavelength ranging from 375 nm to 387 nm show a high reflectivity and a wide stopband. To confirm the results above, crack-free $Al_{0.2}Ga_{0.8}N$/GaN DBRs with different Bragg wavelength and different pairs are prepared. The relationship between the reflectivity and the Bragg wavelength for the prepared DBRs is agreed with the calculation results. Especially, a high peak reflectivity of 95% and wide stopband of about 15 nm are achieved for the 50-pair crack-free $Al_{0.2}Ga_{0.8}N$/GaN DBRs with Bragg wavelength at 385 nm. It is reasonable

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