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论文

# 纳米孔氮化镓材料的制备和研究

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摘要
介绍了一种在氮化镓外延片表面制备得到孔径为纳米量级的多孔结构的工艺。用电化学方法制备出孔径为纳米量级的多孔阳极氧化铝模板作为掩模，经过电感耦合等离子体（ICP）刻蚀制备得到纳米孔氮化镓材料。孔的大小和孔间距可以通过改变阳极氧化条件来控制，改变刻蚀时间可以控制孔深。刻蚀所用气体为氯气和惰性气体的混合物。扫描电镜照片显示，掩模图形能够很好地转移到GaN材料上。刻蚀后的材料经光荧光谱（PL Spectra）谱和Raman散射谱测试，显示出良好的光学特性，并在一定程度上释放了应力。

关键词 氮化镓 纳米孔 阳极氧化铝 ICP刻蚀 Raman

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## Fabrication of nanoporous GaN films with AAO masks and ICP etching

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**Abstract** GaN films with nanopore arrays were fabricated by inductive coupled plasma (ICP) etching using anodic aluminum oxide (AAO) templates as mask. Nanoporous AAO templates were formed by evaporating Al films on GaN epilayers and then anodizing the Al films. Cl2/Ar and Cl2/He were employed as etching gas. Scanning electron microscopy (SEM) analysis shows that the nanoporous arrays can directly be transferred from AAO masks to GaN films in some proper conditions without any change in the pattern. Photoluminescence (PL) spectra and Raman spectroscopy were applied to assess optical and crystalline properties of nanoporous GaN films. This cost-effective, nonlithographic method to produce nano-patterned GaN templates is expected to be useful for fabrication of nitride-based nanostructures and photonic band gap materials.

**Key words** GaN nanoporous AAO ICP Raman

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