

PLD法生长高质量 ZnO薄膜及其光电导特性研究

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摘要 采用脉冲激光沉积(PLD)法在单晶Si(100)衬底上生长ZnO薄膜, 以X射线衍射(XRD)和场发射扫描电镜(SEM)等手段分析了所得ZnO薄膜的晶体结构和微观形貌. 结果表明, 随着衬底温度和薄膜生长时氧分压的增加, ZnO薄膜的晶体结构和化学计量比得到显著改善. 优化工艺(700℃, 20Pa)

下生长的ZnO薄膜呈c轴高度择优取向, 柱状晶垂直衬底表面生长, 结构致密均匀.

以不同暗电阻的ZnO薄膜为材料, 利用剥离(lift-off)技术制备了MSM结构ZnO光电导型紫外探测器.

紫外光照射前后的I-V特性测试表明ZnO薄膜产生非常明显的光电导现象, 分析了其光电响应机理.

关键词 [ZnO薄膜](#) [脉冲激光沉积](#) [光电导紫外探测器](#) [光电响应机理](#)

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Growth of High Quality ZnO Films by Pulsed Laser Deposition and Its Photoresponsivity Characteristics

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Abstract Highly c-axis oriented ZnO thin films were grown on Si (100) substrate by pulsed laser deposition (PLD) technique. X-ray diffraction (XRD) and field emission scanning electron microscopy (FESEM) were employed to analyze the crystalline and microscopic structure of the films. Results show that with the increase of substrate temperature and oxygen pressure, the crystallinity is enhanced and the film presents smooth, dense and uniformed microstructure, and strong interface bonding with substrate under optimal conditions. The photoconductive UV detectors based on ZnO films with interdigital (IDT) configuration were fabricated by the lift-off photo-etching method. The I-V characteristics of the detectors before and after ultraviolet illumination were also investigated, indicating a good ohmic behavior between electrodes and ZnO films, and significant photoresponsivity was observed under UV illumination.

Key words [ZnO film](#) [pulsed laser deposition \(PLD\)](#) [photoconductive UV detector](#) [photoresponsivity mechanism](#)

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