

论文

脉冲激光沉积氮化铝薄膜的电学性能研究

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摘要 采用脉冲激光沉积 (PLD) 技术在硅片上合成了 AlN 薄膜。X 射线衍射 (XRD) 结果证实制备的 AlN 薄膜具有 (002) 择优取向的六方纤锌矿晶体结构, 并且结晶质量随 Si 衬底温度的提高而改善。电流-电压 (I-V)、电容-电压 (C-V)、极化曲线结果表明室温生长的 AlN 薄膜的击穿场强约 2.5 MV/cm, 同时呈现明显的极化现象 (类铁电), 对应矫顽场强为 150 kV/cm, 剩余极化为 0.002 C/m²。晶态 AlN 存在较强的自发极化, 薄膜中可动电荷密度高, 据此提出了动态电荷模型, 指出较大的 AlN 薄膜极化回线是由于可动电荷在电场中的再分布形成的, 因而有别于铁电材料。

关键词 [AlN 薄膜](#) [极化](#) [电学性能](#)

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Electrical properties of AlN films prepared by pulsed laser deposition

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Abstract AlN films were synthesized on Si substrates by pulsed laser deposition (PLD). X-ray diffraction (XRD) spectra show that the films have a (002)-oriented hexagon wurstite crystalline structure and the crystallinity becomes better with higher substrate temperature. Current-voltage (I-V), capacitance-voltage (C-V) and polarization measurements demonstrate that the room-temperature grown sample has a breakdown field of 2.5 MV/cm, and also a clear polarization hysteresis. Based on the intrinsic large spontaneous polarization in crystalline AlN and the large dynamic charge density in the samples, a dynamic charge model is proposed to interpret the observed polarization, which is due to redistribution of dynamic charges. Therefore it's different from ferroelectric materials.

Key words [AlN films](#) [polarization](#) [electrical property](#)

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