

论文

基于非线性介电薄膜的电调滤波器优化设计

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收稿日期 2005-8-16 修回日期 2005-11-10 网络版发布日期 2006-8-24 接受日期

摘要 采用脉冲激光沉积(PLD)法在(001)MgO基片上制备出高质量的SrTiO₃(STO)薄膜, 构建了Au/STO/MgO结构的叉指电容。在77K、10KHz条件下, 对叉指电容的特性进行了测试, 结果表明: 在40 kV/cm的直流电场作用下, 电容值从1.75 pF减小为1.25 pF, 电容值的相对变化率为28.5%。在此基础上, 根据多层介质叉指电容保角变换模型。定量计算和仿真了STO薄膜的介电常数和微波频率下叉指电容的性能参数, 并由此设计了一个三阶带通滤波器, 该滤波器可实现13~50%的中心频率移动。

关键词 [STO](#) [薄膜](#) [介电性质](#) [叉指电容](#) [滤波器](#)

分类号 [0484](#)

Optimized design of electrically tunable filter based on nonlinear dielectric film

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Abstract Excellent (001) SrTiO₃ (STO) thin films were grown on (001) MgO substrates by pulsed laser deposition (PLD) method. Interdigital capacitors (IDC) were fabricated on the STO films. When the electric field increases from 0 kV/cm to 40 kV/cm, the capacitance drops from 1.75 pF to 1.25 pF at 77K and 10kHz. The permittivity ϵ_r of STO films were calculated by the conformal mapping-based models. A three-pole bandpass filter based on the IDC was designed. Excellent performances of the filter are achieved.

Key words [STO](#) [thin film](#) [dielectric properties](#) [IDC](#) [filter](#)

DOI:

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