

## PT种子层对微力传感器性能的影响

作者: 孟汉柏<sup>2</sup>, 崔岩<sup>1</sup>, 王兢<sup>3</sup>, 陈会林<sup>2</sup>, 王立鼎<sup>2</sup>

单位: 1.大连理工大学精密与特种加工教育部重点实验室, 2. 大连理工大学微纳米技术及系统辽宁省重点实验室, 3.大连理工大学电子与信息工程学院

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摘要:

为了提高微牛顿量级微力传感器的灵敏度, 比较了有PT种子层和无PT种子层的PZT压电薄膜对微力传感器性能的影响。运用Sol-Gel (溶胶-凝胶) 法制作了PZT和PT/PZT/PT薄膜, 采用X射线衍射技术表征了PZT和PT/PZT/PT两种薄膜的成相特征, 用半导体参数测试仪测试了PZT和PT/PZT/PT两种薄膜的漏电流。结果表明, 在同为600°C退火温度下, 两种薄膜均具有钙钛矿结构, 而且PT/PZT/PT薄膜沿(100)晶向强烈取向。当外加电压增加时, PZT薄膜的漏电流基本保持不变; PT/PZT/PT薄膜的漏电流变化在1nA左右。最后应用MEMS工艺分别制作了基于PZT, PT/PZT/PT压电薄膜微悬臂梁结构的微力传感器, 并在静态和准静态下对微力传感器的传感特性进行了测试。测试结果表明, 添加PT种子层对悬臂梁的弹性常数基本没有影响, 但微悬臂梁的灵敏度显著增加。

关键词: PZT薄膜; PT/PZT/PT薄膜; 微悬臂梁; 微力传感器; 压电系数

## Influence of the PT seeding layer to the properties of the microforce sensor

**Author's Name:** MENG Han-bai<sup>2</sup>, CUI Yan<sup>1</sup>, WANG Jing<sup>3</sup>, CHEN Hui-lin<sup>2</sup>, WANG Li-ding<sup>2</sup>

**Institution:** 1.Key Laboratory for Precision and Non-traditional Machining Technology of Ministry of Education, Dalian University of Technology, 2.Key laboratory for Micro/Nano Technology and System of Liaoning Province, Dalian University of Technology, 3.....

**Abstract:**

For improving the sensitivity of the micro-Newton level force sensor, the properties of the microforce sensors with PT seeding layer and without PT seeding layer piezoelectric PZT thin film were compared. The PZT and PT/PZT/PT thin films were fabricated using sol-gel method and investigated using X-ray diffraction; the leakage current property of them was measured. The result shows that the two kinds of thin film had perovskite tetragonal structure and the PT/PZT/PT thin film strongly oriented in perovskite (100) at the same 600°C anneal temperature. As the applied voltage increases, the leakage current of the PZT thin film remained basically unchanged, the leakage current of the PT/PZT/PT thin film was retained about 1nA. The microforce sensors based on the PZT, PT/PZT/PT thin films with microcantilever structure were fabricated using MEMS technics at last. The sensing properties of microforce sensor were measured in static state and in quasi-static state. The result showed that their spring constants had no change whether the PT seeding layer was appended or not, but the sensitivities were improved when the PT seeding layer was appended.

**Keywords:** PZT thin film, PT/PZT/PT thin film, Microcantilevers, Microforce sensors, piezoelectric constant

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