传感技术学报
中国微米纳米技术学会
全国高校传感技术研究会 主办

基于GaAs MMIC技术的残余应力测试结构的模拟与设计

作　者：蒋明霞, 杨刚, 周易, 肖建斌, 廖小平

单　位：东南大学MEMS教育部重点实验室

基金项目：基于MEMS功率传感技术的单片微波相位集成检测系统的设计理论与实现方法的研究,基于MEMS功率传感器的无线接收式微波频率检测集成系统的设计理论和实现方法的研究,在线式微波功率传感器设计理论与实现方法

摘　要：

残余应力对开关梁的力学特性有着重要的影响。梁的弹性系数k由梁的形状和材料特性（杨氏模量和残余应力）来决定。应力梯度会使悬臂梁发生卷曲，对k也会产生影响。由残余应力引起的梁的长度变化量在微米级别，一般实验仪器难于测量。基于GaAs基和Si基的器件残余应力不同，相应的测试结构需重新设计。为了克服这些问题，本论文重新模拟并优化了微旋转式残余应变测试结构，尽量简化对测试仪器的要求。本文使用Intellisuite仿真软件以及Matlab软件优化，同时采用对称式的结构增加了测试精度。最后本文还给出了应力梯度的测试方法。

关键词：GaAs，残余应力，应力梯度，实验验证

Simulation and Design on Test Structure for residual stress based on GaAs MMIC Technology

Author's Name:

Institution:

Abstract:

Residual stress on the beams of MEMS switches has an important effect to its mechanical properties. The coefficient of elasticity k of the beam is determined by the beam shape and material properties, such as Young's modulus and residual stress. The stress gradient will bend cantilever beams, and will also affect the coefficient of elasticity k. The length variation of the beam caused by residual stress is in the micrometer-level, and difficult to measure with general experimental apparatus. Residual stress of devices based on GaAs and Si is different, and thus the test structure based on these two materials is different and need to redesign. In order to solve such problems, this paper uses and optimizes micro-rotating structure of the residual stress measurement, which will simplify the requirements for test instruments. Matlab and simulation software Intellisuite is used for design. And this structure is a symmetric structure, which can double precision of test results. This paper also gives test method of the stress gradient.

Keywords: GaAs, Residual stress, Stress gradient, experimentally verification

投稿时间：**2011-11-25**

查看pdf文件