

## 体硅加工的压电式微加速度计的设计

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摘要:

提出并设计了一种采用体硅微制造工艺制造的压电式微加速度计, 其中体硅加工的硅质量块由悬臂梁支撑且悬臂梁部分区域沉积ZnO压电薄膜。通过对压电悬臂梁建立一维解析模型, 研究了影响加速度计灵敏度的结构因素。在此基础上, 利用有限元方法软件ANSYS设计了实际的微加速度计, 并对六种不同的微加速度计结构进行了分析, 得到了不同结构微加速度计的工作频率范围及灵敏度结果。

关键词: MEMS; 体硅微加工工艺; 压电式微加速度计; 氧化锌

## Design of A Bulk-Micromachined Piezoelectric Accelerometer

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**Abstract:**

A bulk-micromachined piezoelectric accelerometer is proposed and designed, in which the bulk-micromachined silicon seismic mass is suspended by the cantilevers and part of cantilever is covered with ZnO piezoelectric thin film. Starting from the fundamental of the accelerometer, we derive the one-dimensional analytical model of the piezoelectric cantilever to study the factors affecting the sensitivity of the accelerometer. Based on these, finite element method in ANSYS is used to design the practical microaccelerometers. Totally, 6 different structures of the microaccelerometers are investigated, which are 1-cantilever, 2-cantilever, and 4-cantilever for one and dual-seismic mass block, respectively. The results show that this type of bulk-micromachined piezoelectric accelerometer can own high sensitivity and wide working range to meet requirement of some applications in aerospace and mechanical shock inspection for vehicles.

**Keywords:** MEMS; bulk-micromachining; piezoelectric microaccelerometer; zinc oxide

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