

摘要：提出了一种采用垂直梳齿驱动器驱动的大尺寸、大扭转角度、低驱动电压微光机电系统(MOEMS)扫描镜。理论分析了垂直器的工作原理，研究了垂直梳齿的制作工艺，采用体硅加工工艺结合硅-硅键合工艺制作了垂直梳齿驱动的MOEMS扫描镜。制作的扫描镜尺寸为3 mm×2 mm，谐振频率为1.32 kHz。测试表明，该扫描镜镜面具有很好的光学表面，其表面粗糙度的均方根只有8.64 nm；在驱动电压为95 V时可以实现最大2.4°的扭转角度；测得其开启时的响应时间为1.887 ms，关断时的响应时间为4.418 ms。

关键词：微光机电系统 扫描微镜 垂直梳齿驱动器 体硅工艺

Large-scale MOEMS scanning mirror actuated by vertical comb

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Abstract: A Micro-opto Electro-mechanical System(MOEMS) scanning mirror with a large size, large torsional angle and a low driving voltage actuated by a vertical comb driver was proposed. The working principle of the vertical comb driver was analyzed and its fabrication process was discussed. By using a bulk micromachining process technology combined with a silicon-silicon bonding process, a vertical comb driver actuated MOEMS scanning mirror was fabricated. The fabricated scanning mirror has a size of 3 mm×2 mm, and a resonant frequency of 1.32 kHz. The test results show that the mirror has a high quality optical surface and the RMS of surface roughness is only 8.64 nm. When the driving voltage is set to be 95 V, the maximum rotation angle of the mirror is 2.4°. Furthermore, the tested turn-on responding time and turn-off responding time for the mirror are 1.887 ms and 4.418 ms, respectively.

Keywords: Micro-opto Electro-mechanical System(MOEMS) Scanning mirror Vertical comb drive Bulk micromachining

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