Improved Mems Microscanners

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Technology description

MEMS scanners that are vertically offset have the potential to be used in a variety of innovative applications. However, these microscanners have several fabrication challenges that make them cost prohibitive for most commercial uses. These fabrication difficulties include the need for: (a) a two-wafer process for the critical-alignment step, (b) the control and replication of the properties of materials such as photoresist or bi-morph layers (when they are used for hinges), (c) a post-process-annealing in a high-temperature furnace following the hand assembly of lid and device chips, and (d) the creation of offset combs by depositing multiple-masking layers (composed of silicon dioxide and silicon nitride).
To address these fabrication issues, researchers at UC Berkeley have developed an innovative process for fabricating torsional microscanners with vertically offset interdigitated-comb actuators. This improved and simplified CMOS-compatible process uses SOI wafers and offers excellent yields with high performance attributes.
These new microscanners have been built with resonant frequencies between 108 Hz and 24 KHz, maximum optical-scanning angles of 70 degrees, and actuation voltages from 10-72.8V.

Additional Information

Related Technologies
Improved MEMS Phase-shifting Interferometer

Application area

Potential Applications

Refractive surgery: These microscanners are especially well adapted for applications in refractive laser surgery of ocular corneas where small spot size and high scan speeds are important.
Photolithography: The photoresist-exposure process used in photolithography is similar to the ablation procedures used in ocular refractive surgery because each is an energy-cumulative process, and therefore maskless, direct photolithography is another well-suited application for these microscanners.

Advantages

Fabrication that is simple, high-yield, high-volume and CMOS-compatible
Microscanners that are high performance and low cost

Institution

University of California, Berkeley

Inventors

David Garmire
James Demmel
Hyuck Choo
Richard Muller

联系我们

叶先生

电 话：021-65679356
手 机：13414935137
邮 箱：yeyingsheng@zf-ym.com