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Electrothermal Microactuators in Standard CMOS Process§

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This paper describes the fabrication of electrothermal microactuators using a standard CMOS process. The field oxide and CVD oxide with polysilicon strips running in between form the electrothermal structure. The differential thermal expansion between adjacent insulating layers gives rise to mechanical deflection. Polysilicon strips are utilized as heating elements to raise the temperature of the electrothermal structure above ambient temperature. For the cantilevers and suspended plate microactuators, typical elastic deflections of 4 μm and 1 μm above the chip surface have been observed, respectively. The cantilever microactuator exhibited a maximum frequency response of 1.5 kHz; and the suspended plate microactuator has shown a maximum frequency response of 2 kHz.

1. Introduction

Recently, there has been rapid growth in the number of reports on microactuators, which are considered to be the key components for such applications as in

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