ABSTRACT

DESIGN AND PROCESS FOR FABRICATING SINGLE CRYSTAL SILICON MICRO-MIRROR SWITCH USING SECONDARY ACTUATORS AND ANGULAR AMPLIFICATION CONCEPT

Design of a micro-mirror switching device and its fabrication in single crystal silicon are described. The device is composed of three main elements. silicon mirror plate with metal-mirror, secondary actuator, and hinge/spring mechanism to integrate the mirror plate with the actuator. p-n junction is first formed on p-type silicon Trenches are then etched in n-silicon to define the device element boundaries and filled with silicon dioxide. Three layers of sacrificial oxide and two structural poly-silicon layers are deposited and patterned to form device elements. Novel release processes, consisting of backside electrochemical etching in potassium-hydroxide, reactive ion etching to expose oxide-filled trenches from the bottom, and hydrofluoric acid etching of sacrificial oxide layers and oxide in silicon trenches, form the silicon blocks, those that are not attached to structural poly-silicon are sacrificed and those that are attached are left in place to hold together the switching device elements

(Fig. 1)



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