

Optimization of Microstructures Used in CMOS-MEMS Devices Based on a Topological Design Process

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Abstract

This paper focuses on the topological design process of microstructures used in CMOS-MEMS sensors in order to establish the best features of mechanical performance. The structures here described can be fabricated using the design rules from a standard CMOS process (On Semiconductor 0.5 microns, N-well, double polysilicon, double metal), followed by a sacrificial layer etching needed for the structure release. Two cases are shown, a stationary mechanical analysis and a stationary electro-mechanical analysis, using the Optimization Module and solid mechanics and electromechanical models in COMSOL Multiphysics® software. The procedure used in this work is to define the effective area intended for the microstructure and given the operating conditions and restrictions of movement, an approximation of the geometry of the sensor is obtained, for then apply design rules established by the manufacturer.