



Smart Materials and Structures

Microelectromechanical systems (MEMS): fabrication, design and applications

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Abstract

Micromachining and micro-electromechanical system (MEMS) technologies can be used to produce complex structures, devices and systems on the scale of micrometers. Initially micromachining techniques were borrowed directly from the integrated circuit (IC) industry, but now many unique MEMS-specific micromachining processes are being developed. In MEMS, a wide variety of transduction mechanisms can be used to convert real-world signals from one form of energy to another, thereby enabling many different microsensors, microactuators and microsystems. Despite only partial standardization and a maturing MEMS CAD technology foundation, complex and sophisticated MEMS are being produced. The integration of ICs with MEMS can improve performance, but at the price of higher development costs, greater complexity and a longer development time. A growing appreciation for the potential impact of MEMS has prompted many efforts to commercialize a wide variety of novel MEMS products. In addition, MEMS are well suited for the needs of space exploration and thus will play an increasingly large role in future missions to the space station, Mars and beyond.

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