

CMOS MEMS Fabrication and Design

Gary K. Fedder

Department of Electrical and Computer Engineering
Carnegie Mellon University, Pittsburgh, PA

The desire for more functions designed into handheld, wearable, and embedded products continues to drive reductions in size, power and cost of microsystems. Integration of MEMS devices with CMOS has evolved over 30 years with these goals in mind. This overview first covers a variety of techniques for fabricating MEMS structures directly in foundry CMOS. Corresponding considerations for successful CMOS-MEMS design are presented in the context of specific implementations including inertial sensors, micromirrors, resonant sensors, and RF components. One highlighted advantage of monolithic integration is the ability to interconnect large arrays of devices on chip and to merge sensor modalities toward higher performing systems. One such recent example from my research is an array of accelerometer, stress and temperature transducers to compensate accelerometer bias drift.