

Guest editorial

In recent years, micro-electro-mechanical systems (MEMS) structures have emerged for a wide range of applications. These include: micro-motors, micro-satellites, accelerometers for the deployment of air bags, micro-switches, sensors and actuators, and biomedical devices. In many of these systems, an understanding of mechanical properties is essential for the design of reliable devices.

However, unlike bulk mechanical properties, which have received considerable attention in the literature, there have only been limited studies of mechanical properties at the micro-scale, where the physics of failure can be considerably different from those in the bulk. Furthermore, the properties may become strongly dependent on size-scale. This is clearly the case for plasticity, which is known to exhibit a strong length-scale dependence at the micron- and sub-micron scales.

This special issue of *The Journal of Materials Science (JMS)* brings together a series of papers on The Mechanical Properties of MEMS Structures. It includes papers on micro-mechanical testing techniques; mechanisms of fatigue and fracture; size effects at the micron and sub-micron scales; residual stress control by the deposition of multilayered thin films, and modeling to predict mechanical properties. The papers were presented in the Materials Sessions at The ASME Symposium on the Mechanical Properties of MEMS Structures, which was held in New York, NY, in November of 2001.

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We hope that the selected papers will provide a wide range of readers with some useful new insights into the mechanical properties of MEMS structures.

Wolé Soboyejo
Princeton University
Princeton, NJ

Roberto Ballarini
Franklin W. Olin College of Engineering
Needham, MA 02492-1245

Seyed Allameh
Princeton University