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**Measurement of Young's modulus of thin films using modal characterization.**[1] DRAGOSLAV GRBOVIC, NICKOLAY LAVRIK, PANOS DATSKOS, University of Tennessee, Knoxville, TN 37996 and Oak Ridge National Laboratory, Oak Ridge, TN 37931 — We present a method for experimentally measuring Young's moduli of thin films using micro-electro-mechanical systems (MEMS). Properties of thin films often differ from those in bulk material and, moreover, depend on deposition method. In this work, we describe the results of measurements of Young's modulus of titanium (Ti) thin film deposited by sputtering. We deposit Ti on microcantilever structures with specified dimensions and known material properties and then experimentally measure the frequency shifts for the first several resonant modes. Using the acquired resonant frequencies in finite element analysis, we obtain the Young's modulus of the deposited Ti film. Our results show that Young's modulus of Ti film deposited by sputtering varies with thickness from ∼60 GPa for 35 nm film to ∼73 GPa for 100 nm film. This approach is fast and independent of material or deposition method. It is especially valuable in determining effective Young's moduli of composite and nanostructured thin film materials with complex relationships between their composition and their properties.

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