Abstract

We present a collaborative work between ASU and UNM, on the mechanical characterization of a metal/ceramic multilayered thin-film system. This type of layered composite has received significant attention because of their high strength, high toughness, damage tolerance, as well as other unique functional properties. We focus on indentation induced deformation and damage, and attempt to correlate the experimental observation with numerical finite element modeling. Special attention is given to internal cracking, plastic deformation during the unloading phase of indentation, and cyclic nanoindentation response. We illustrate how numerical modeling, when properly conducted, can support experimental studies and help reveal hidden phenomena.

Biosketch

Yu-Lin Shen received his Ph.D. in engineering from Brown University in 1994. He was a post-doctoral research associate at Massachusetts Institute of Technology between 1994 and 1996. He has been with the University of New Mexico since 1996, where he is currently a Professor in the Department of Mechanical Engineering. Professor Shen has been active in research related to numerical modeling and mechanical behavior of materials, with applications in the areas of thin films, microelectronic devices and packages, and composite materials. He has published more than 150 research papers, most of which are journal articles. His book titled “Constrained Deformation of Materials” was published by Springer in 2010. In 2005 Professor Shen was elected Fellow of American Society of Mechanical Engineers.