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Test Procedures and Equipment for the Mechanical Evaluation of Nanostructured Systems and Other Brittle Materials

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Abstract

The proposed complex approach, including modification of procedures and development of equipment for micro- and macromechanical tests of brittle materials, allows a comprehensive understanding of their mechanical behavior at low costs. The set of our equipment also includes a commercially available nanoindentation test machine. All this equipment covers test potentials from nano- to macrolevels. Special attention is given to fracture toughness evaluation because this characteristic can control possible applications of these materials. The procedures and equipment can be used for testing semiconductors, dental ceramics, nanostructured materials, and others on small-size specimens in contrast to standard ones which can be much larger than the items produced by these materials. Besides, standard specimens are often too expensive, the complicated equipment used for this purpose is also of high price. The procedures and equipment developed can be used in any standard mechanical test laboratory, they are inexpensive and easy in operation.

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