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B. Bhushan
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Applied Scanning Probe Methods



Springer

Applied Scanning Probe Methods

Bharat Bhushan, Harald Fuchs



Applied Scanning Probe Methods:

Applied Scanning Probe Methods XII Bharat Bhushan, Harald Fuchs, 2008-10-24 Crack initiation and growth are key issues when it comes to the mechanical reliability of microelectronic devices and microelectromechanical systems MEMS Especially in organic electronics where flexible substrates will play a major role these issues will become of utmost importance It is therefore necessary to develop methods which in situ allow the experimental investigation of surface deformation and fracture processes in thin layers at a micro and nanometer scale While scanning electron microscopy SEM might be used it is also associated with some major experimental drawbacks First of all if polymers are investigated they usually have to be coated with a metal layer due to their commonly non conductive nature Additionally they might be damaged by the electron beam of the microscope or the vacuum might cause outgassing of solvents or evaporation of water and thus change material properties Furthermore for all kinds of materials a considerable amount of experimental effort is necessary to build a tensile testing machine that fits into the chamber Therefore a very promising alternative to SEM is based on the use of an atomic force microscope AFM to observe in situ surface deformation processes during straining of a specimen First steps towards this goal were shown in the 1990s in 14 but none of these approaches truly was a microtensile test with sample thicknesses in the range of micrometers To the authors knowledge this was shown for the first time by Hild et al in 516 [Applied Scanning Probe Methods X](#) Bharat Bhushan, Harald Fuchs, Masahiko Tomitori, 2007-12-20 The volumes VIII IX and X examine the physical and technical foundation for recent progress in applied scanning probe techniques This is the first book to summarize the state of the art of this technique The field is progressing so fast that there is a need for a set of volumes every 12 to 18 months to capture latest developments These volumes constitute a timely comprehensive overview of SPM applications **Applied Scanning Probe Methods XI** Bharat Bhushan, Harald Fuchs, 2008-10-22 The volumes XI XII and XIII examine the physical and technical foundation for recent progress in applied scanning probe techniques These volumes constitute a timely comprehensive overview of SPM applications Real industrial applications are included **Applied Scanning Probe Methods VIII** Bharat Bhushan, Harald Fuchs, Masahiko Tomitori, 2007-12-20 The success of the Springer Series Applied Scanning Probe Methods I VII and the rapidly expanding activities in scanning probe development and applications worldwide made it a natural step to collect further specific results in the fields of development of scanning probe microscopy techniques Vol VIII characterization Vol IX and biomimetics and industrial applications Vol X These three volumes complement the previous set of volumes under the subject topics and give insight into the recent work of leading specialists in their respective fields Following the tradition of the series the chapters are arranged around techniques characterization and biomimetics and industrial applications Volume VIII focuses on novel scanning probe techniques and the understanding of tip sample interactions Topics include near field imaging advanced AFM specialized scanning probe methods in life sciences including new self-sensing cantilever systems combinations of AFM sensors and

scanning electron and ion microscopes calibration methods frequency modulation AFM for application in liquids Kelvin probe force microscopy scanning capacitance microscopy and the measurement of electrical transport properties at the nanometer scale Vol IX focuses on characterization of material surfaces including structural as well as local mechanical characterization and molecular systems The volume covers a broad spectrum of STM AFM investigations including fullerene layers force spectroscopy for probing material properties in general biological films and cells epithelial and endothelial layers medical related systems such as amyloid aggregates phospholipid monolayers inorganic films on aluminium and copper oxides tribological characterization mechanical properties of polymer nanostructures technical polymers and near field optics

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