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Preface

The scanning probe microscopy field has been rapidly expanding. It is a demanding task to collect a timely overview of this field with an emphasis on technical developments and industrial applications. It became evident while editing Vols. I–IV that a large number of technical and applicational aspects are present and rapidly developing worldwide. Considering the success of Vols. I–IV and the fact that further colleagues from leading laboratories were ready to contribute their latest achievements, we decided to expand the series with articles touching fields not covered in the previous volumes. The response and support of our colleagues were excellent, making it possible to edit another three volumes of the series. In contrast to topical conference proceedings, the applied scanning probe methods intend to give an overview of recent developments as a compendium for both practical applications and recent basic research results, and novel technical developments with respect to instrumentation and probes.

The present volumes cover three main areas: novel probes and techniques (Vol. V), characterization (Vol. VI), and biomimetics and industrial applications (Vol. VII).

Volume V includes an overview of probe and sensor technologies including integrated cantilever concepts, electrostatic microscanners, low-noise methods and improved dynamic force microscopy techniques, high-resonance dynamic force microscopy and the torsional resonance method, modelling of tip cantilever systems, scanning probe methods, approaches for elasticity and adhesion measurements on the nanometer scale as well as optical applications of scanning probe techniques based on nearfield Raman spectroscopy and imaging.

Volume VI is dedicated to the application and characterization of surfaces including STM on monolayers, chemical analysis of single molecules, STM studies on molecular systems at the solid–liquid interface, single-molecule studies on cells and membranes with AFM, investigation of DNA structure and interactions, direct detection of ligand protein interaction by AFM, dynamic force microscopy as applied to organic/biological materials in various environments with high resolution, noncontact force microscopy, tip-enhanced spectroscopy for investigation of molecular vibrational excitations, and investigation of individual carbon nanotube polymer interfaces.

Volume VII is dedicated to the area of biomimetics and industrial applications. It includes studies on the lotus effect, the adhesion phenomena as occurs in gecko feet, nanoelectromechanical systems (NEMS) in experiment and modelling, application of STM in catalysis, nanostructuring and nanoimaging of biomolecules for

biosensors, application of scanning electrochemical microscopy, nanomechanical investigation of pressure sensitive adhesives, and development of MOEMS devices.

As in the previous volumes a distinction between basic research fields and industrial scanning probe techniques cannot be made, which is in fact a unique factor in nanotechnology in general. It also shows that these fields are extremely active and that the novel methods and techniques developed in nanoprobe basic research are rapidly being transferred to applications and industrial development.

We are very grateful to our colleagues who provided in a timely manner their manuscripts presenting state-of-the-art research and technology in their respective fields. This will help keep research and development scientists both in academia and industry well informed about the latest achievements in scanning probe methods. Finally, we would like to cordially thank Dr. Marion Hertel, senior editor chemistry, and Mrs. Beate Siek of Springer for their continuous support and advice without which these volumes could have never made it to market on time.

July, 2006

Prof. Bharat Bhushan, USA
Prof. Harald Fuchs, Germany
Prof. Satoshi Kawata, Japan

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