1. Record Nr. UNINA9910876617903321 Nano and micromachining / / edited by J. Paulo Davim, Mark J. Jackson Titolo Hoboken, NJ,: John Wiley & Sons, 2009 Pubbl/distr/stampa **ISBN** 1-282-16549-6 9786612165498 0-470-61180-4 0-470-61027-1 Descrizione fisica 1 online resource (224 p.) ISTE Collana Altri autori (Persone) DavimJ. Paulo JacksonMark J Disciplina 620.5 620/.5 Soggetti Nanotechnology Micromachining Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Note generali Description based upon print version of record. Nota di bibliografia Includes bibliographical references and index. Nota di contenuto Nano and Micromachining; Table of Contents; Preface; Chapter 1. Nanoscale Cutting; 1.1. Introduction; 1.2. Basic elements of molecular dynamics modeling; 1.2.1. Material representation and microstructure; 1.2.2. Atomic interaction: 1.2.3. System dynamics and numerical description; 1.2.4. Boundary conditions; 1.3. Design and requirements for state-of-the-art MD cutting process simulations; 1.4. Capabilities of MD for nanoscale material removal process analysis; 1.4.1. Analysis of microstructure and deformation; 1.4.2. Obtaining cutting forces, stress and temperature 1.5. Advances and recent developments in material removal process simulation 1.5.1. Complete 3D surface machining simulation; 1.5.2. Consideration of fluids in MD cutting simulation; 1.6. Summary and outlook; 1.7. References; Chapter 2. Ductile Mode Cutting of Brittle Materials: Mechanism, Chip Formation and Machined Surfaces; 2.1. Introduction; 2.2. The mechanism of ductile mode cutting of brittle materials; 2.2.1. Transition of chip formation mode from ductile to

brittle; 2.2.2. MD modeling and simulation of nanoscale ductile mode

cutting of silicon

silicon2.3. The chip formation in cutting of brittle materials; 2.3.1. Material deformation and crack initiation in the chip formation zone: 2.3.2. Stress conditions in the chip formation zone in relation to ductile-brittle mode of chip formation; 2.4. Machined surfaces in relation to chip formation mode; 2.5. References; Chapter 3. Diamond Tools in Micromachining; 3.1. Introduction; 3.2. Diamond technology; 3.2.1. Hot Filament CVD (HFCVD); 3.3. Preparation of substrate; 3.3.1. Selection of substrate material 3.3.2. Pre-treatment of substrate 3.4. Modified HFCVD process; 3.4.1. Modification of filament assembly; 3.4.2. Process conditions; 3.5. Nucleation and diamond growth; 3.5.1. Nucleation; 3.5.2. Biasenhanced nucleation (BEN); 3.5.3. Influence of temperature; 3.6. Deposition on complex substrates; 3.6.1. Diamond deposition on metallic (molybdenum) wire; 3.6.2. Deposition on WC-Co microtools; 3.6.3. Diamond deposition on tungsten carbide (WC-Co) microtool; 3.7. Diamond micromachining; 3.7.1. Performance of diamond-coated microtool; 3.8. Conclusions; 3.9. References Chapter 4. Conventional Processes: Microturning, Microdrilling and Micromilling 4.1. Introduction; 4.1.1. Definitions and technological possibilities; 4.1.2. Main applications of micromachining; 4.2. Microturning: 4.2.1. Characteristic features and applications: 4.2.2. Microturning tools and tooling systems; 4.2.3. Machine tools for microturning; 4.3. Microdrilling; 4.3.1. Characteristic features and applications; 4.3.2. Microdrills and tooling systems; 4.3.3. Machine tools for microdrilling; 4.4. Micromilling; 4.4.1. Characteristic features and applications 4.4.2. Micromills and tooling systems

2.2.3. The mechanism of ductile mode chip formation in cutting of

Sommario/riassunto

This book provides the fundamentals and recent advances in nano and micromachining for modern manufacturing engineering. It begins by outlining nanomachining before discussing various advances in field and machining processes. The coverage concludes with an evaluation of subsurface damages in nano and micromachining and a presentation of applications in industry. As such, this book serves both as a useful classroom text for engineering and machining courses at the undergraduate and graduate level, and as a reference for academics and engineers in these areas.