

## CONTENTS

**Machining and Fixed Abrasive Grinding**

Precision Ceramic Grinding Process Development for Brittle Materials	3
Process Diagnostics for Precision Grinding Brittle Materials in a Production Environment	11
Air Bearing Spindle Instrumentation for Precision Grinding Ceramics	17
Diamond Wear in High-Speed Grinding of Silicon Nitride	27
Fine Grinding of Aluminum Oxide Ceramics by Metal Bonded Diamond Segments	39
ELID Grinding of Ceramic Materials	47
Finish Grinding of PCD and PCBN Cutting Tools	57
Chemo-Mechanical Machining of Ceramics	67
Laser Scoring of Glass (Invited Contribution)	77
How Much Energy is Needed in Sawing?	87

**Loose Abrasive Grinding and Polishing**

Surmise and Experience in Abrasive Fabrication Development (Invited Contribution)	99
Material Removal Mechanisms from Grinding to Polishing (Invited Contribution)	113
Grinding-Induced Residual Forces in Sapphire	129
A 'Gentle' Method for Finishing Si <sub>3</sub> N <sub>4</sub> Balls for Hybrid Bearing Applications (Invited Contribution)	139
Subsurface Structure in Lapped and Polished Fused Silica and Diamond Turned Sing Crystal	163
Fixed Abrasive Grinding of Glass	175
An Overview of Magnetorheological Finishing (MRF) for Precision Optics Manufacturing (Invited Contribution)	185
Studies of Material Removal in Magnetorheological Finishing (MRF) from Polishing Spots	201

**Chemical-Mechanical Polishing**

Nanometer Scale Investigations of Chemical Mechanical Polishing Mechanisms using Scanning Force Microscopy (Invited Contribution)	213
Substrate Requirements for Extreme Ultraviolet Lithography	233
Tribochemical Reactions of Silicon Nitride in Aqueous Solutions (Invited Contribution)	245
Solvent (pH) and Abrasive Effects in Chemical Mechanical Polishing (CMP) of Si <sub>3</sub> N <sub>4</sub>	259
Identification of the Mechanical Aspects of Material Removal Mechanisms in Chemical Mechanical Polishing (CMP)	269
The Role of the Physical Properties of Alumina Abrasive in the Chemical-Mechanical Polishing of Copper	281
Preston Equation and Its Modification for Copper Polishing-Pressure Dependence	291
A New Flame Technology for the Production of Nanopowders: Implications for Chemical Mechanical Polishing	301

**Material and Surface Characterization**

Design and Reliability of Glass Structures	311
Evaluating Effects of Processing and Surface Finishing on Crack-Initiation Behavior	
Using Recording Microindentation	321
Determination of Machining Crack Geometry by Dye Impregnation Technique	331
Fluorination of AlN Ceramics, Silicon, and Silica in an Inductively Coupled NF <sub>3</sub> Plasma	341
Optimization of Wafer Cleaning for Silicon Power Semiconductor Devices	351
Index	361