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Materials and the Temperature-Time Superposition Principle; 3.1.5 Materials Design for Realizing Nanoimprints; 3.2 Applicable Processes Used for Nanopattern Transfer; 3.2.1 Introduction of Injection Molding Process; 3.2.2 Problems of the Injection Molding Process; 3.2.3 Advantages of the Thermal Imprinting Process; 3.3 Pattern Transfer Mechanism of Thermal Cycle NIL; 3.3.1 Introduction of Thermal Imprinting Process; 3.3.2 In-situ Observation of Thermal Imprinting Process; 3.3.3 Offline Measurement of Replication Process in Thermal Cycle NIL; 3.4 Modeling of Nanopattern Transfer; 3.4.1 Importance of Viscosity in Thermal Imprinting Process; 3.4.2 Mathematical Treatment in Injection Molding and Thermal Imprinting Process; 3.4.3 Process Simulation in Micro- and Nanopattern Transfer; References; Chapter 4 Mold Fabrication Process; 4.1 Ultra Precision Cutting Techniques Applied to Metal Molds Fabrication for Nanoimprint Lithography; 4.1.1 Introduction; 4.1.2 Cutting of Fine Groove Shape; 4.1.3 Method of Cutting Groove; 4.1.4 Precision Cutting of Cylindrical Material; 4.1.5 High-speed, Ultra Precision Machining System; 4.1.6 Fine Pattern Processing by Bit Map Data; 4.1.7 Machining of Dot Pattern Array; 4.1.8 Improvement Points of the System; 4.1.9 Summary; 4.2 Nanoimprint Mold Fabrication Using Photomask Technology; 4.2.1 Introduction; 4.2.2 Summary of Mold Manufacturing Process; 4.2.3 Pattern Writing Technique; 4.2.4 Dry Etching; 4.2.5 Examples of Fabricated Mold; 4.2.6 Summary; References; Chapter 5 Ultraviolet Nanoimprint Lithography; 5.1 Orientation and Background of UV-NIL; 5.2 Transfer Mechanism of UV-NIL; 5.2.1 Viscosity and Capillary Force; 5.2.2 Release Coating and Evaluation of Release Properties; 5.2.3 Release Coating Effect; 5.3 UV-NIL Materials and Equipment; 5.3.1 Ubiquitous NIL Machines; 5.3.2 UV Nanoimprint Process Tool; 5.3.3 UV-photocurable Resin; 5.3.4 Fluorinated Polymers for UV-NIL; 5.3.5 Cationic Curable Resins for UV-NIL; 5.3.6 Molding Agents for Nanoimprinting; 5.4 Evaluation Method; 5.4.1 Macro Evaluation Technique of Nanoscale Pattern Shape and Evaluation Device; 5.4.2 Characterization of Photocurable Resin for UV Nanoimprint; References; Chapter 6 Applications and Leading-Edge Technology; 6.1 Advanced Nanoimprinting Technologies

Sommario/riassunto

Nanoscale pattern transfer technology using molds is a rapidly advancing area and one that has seen much recent attention due to its potential for use in nanotechnology industries and applications. However, because of these rapid advances, it can be difficult to keep up with the technological trends and the latest cutting-edge methods. In order to fully understand these pioneering technologies, a comprehensive understanding of the basic science and an overview of the techniques are required. Nanoimprint Technology: Nanotransfer for Thermoplastic and Photocurable Polymers covers