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Nota di contenuto	3D Laser Microfabrication; Contents; List of Contributors; 1 Introduction; 2 Laser-Matter Interaction Confined Inside the Bulk of a Transparent Solid; 2.1 Introduction; 2.2 Laser-matter Interactions: Basic Processes and Governing Equations; 2.2.1 Laser Intensity Distribution in a Focal Domain; 2.2.2 Absorbed Energy Density Rate; 2.2.3 Electron-phonon (ions) Energy Exchange, Heat Conduction and Hydrodynamics: Two-temperature Approximation; 2.2.4 Temperature in the Absorption Region; 2.2.5 Absorption Mechanisms 2.2.6 Threshold for the Change in Optical and Material Properties ("Optical Damage")2.3 Nondestructive Interaction: Laser-induced Phase Transitions; 2.3.1 Electron-Phonon Energy Exchange Rate; 2.3.2 Phase Transition Criteria and Time; 2.3.3 Formation of Diffractive Structures in Different Materials; 2.3.3.1 Modifications Induced by Light in Noncrystalline Chalcogenide Glass; 2.3.3.2 Two-photon Excitation of Fluorescence; 2.3.3.3 Photopolymerization; 2.3.3.4 Photorefractive

Effect; 2.4 Laser-Solid Interaction at High Intensity; 2.4.1 Limitations Imposed by the Laser Beam Self-focusing
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2.4.5 Shock Wave Expansion and Stopping 2.4.6 Shock and Rarefaction Waves: Formation of Void; 2.4.7 Properties of Shock-and-heat-affected Solid after Unloading; 2.5 Multiple-pulse Interaction: Energy Accumulation; 2.5.1 The Heat-affected Zone from the Action of Many Consecutive Pulses; 2.5.2 Cumulative Heating and Adiabatic Expansion; 2.6 Conclusions; 3 Spherical Aberration and its Compensation for High Numerical Aperture Objectives; 3.1 Three-dimensional Indensity Point-spread Function in the Second Medium; 3.1.1 Refractive Indices Mismatch-induced Spherical Aberration
3.1.2 Vectorial Point-spread Function through Dielectric Interfaces 3.1.3 Scalar Point-spread Function through Dielectric Interfaces; 3.2 Spherical Aberration Compensation by a Tube-length Change; 3.3 Effects of Refractive Indices Mismatch-induced Spherical Aberration on 3D Optical Data Storage; 3.3.1 Aberrated Point-spread Function Inside a Bleaching Polymer; 3.3.2 Compensation for Spherical Aberration Based on a Variable Tube Length; 3.3.3 Three-dimensional Data Storage in a Bleaching Polymer; 3.4 Effects of Refractive Index Mismatch Induced Spherical Aberration on the Laser Trapping Force
3.4.1 Intensity Point-spread Function in Aqueous Solution

Sommario/riassunto

A thorough introduction to 3D laser microfabrication technology, leading readers from the fundamentals and theory to its various potent applications, such as the generation of tiny objects or three-dimensional structures within the bulk of transparent materials. The book also presents new theoretical material on dielectric breakdown, allowing a better understanding of the differences between optical damage on surfaces and inside the bulk, as well as a look into the future. Chemists, physicists, materials scientists and engineers will find this a valuable source of interdisciplinary know
