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Nota di contenuto	Part I: Fundamental Processes in Laser 2D/3D Nanostructuring Chapter 1: Insights into laser-matter interaction from inside: wealth of processes, multiplicity of mechanisms and possible roadmaps for energy localization Chapter 2: The atomistic perspective of nanoscale laser ablation Chapter 3: Ultrafast quantum processes at the nanoscale: insights from modelling Chapter 4: The universality of self-organisation; where is the limit? A way forward to an atom printer? Chapter 5: How light drives material periodic patterns down to the nanoscale Chapter 6: In-situ observation of the formation of laser-induced periodic surface structures with extreme spatial and temporal resolution Chapter 7: Probing matter by light Chapter 8: Probing light by matter: Implications of complex illumination on

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ultrafast nanostructuring -- Chapter 9: Imaging Dynamics of Femtosecond Laser Induced Surface Nanostructuring -- Part II: Concepts of Extreme Nanostructuring -- Chapter 10: Macro-scale microfabrication enabled by nano-scale morphological control of laser internal modification -- Chapter 11: Optical nanostructuring by nearfield laser ablation -- Chapter 12: Nanoscale plasmonic printing --Chapter 13: Search for high-pressure silicon phases: Reaching the extreme conditions with high-intensity laser irradiation -- Chapter 14: Periodic surface structures by laser interference ablation -- Chapter 15: Spatial beam shaping with a liquid-crystal spatial light modulator for surface micro- and nanoprocessing -- Chapter 16: Non-standard light for ultrafast laser micro- and nano- structuring -- Chapter 17: Controlled nanostructuring of transparent matter with temporal Airy pulses -- Chapter 18: Ultraprecise surface processing by etching with laser-induced plasma -- Chapter 19: Nanostructuring by photochemistry: Laser induced type A modification -- Chapter 20: Subtractive 3D laser nanolithography of crystals by giant wet-chemical etching selectivity -- Chapter 21: Ultrafast meets ultrasmall: where are the limits of ultrafast waveguide writing? -- Chapter 22: Multi-photon 3D lithography and calcination for sub-100-nm additive manufacturing of inorganics -- Part III: Functions and Applications -- Chapter 23: Creation of material functions by nanostructuring -- Chapter 24: Role of surface chemistry on wettability of laser machined metallic surfaces -- Chapter 25: Ultrafast laser biomimetic micro/nanostructuring --Chapter 26: Ultrarapid industrial large area processing using laser interference patterning methods -- Chapter 27: Internal structuring of semiconductors with ultrafast lasers: opening a route to threedimensional silicon photonics -- Chapter 28: Nanoscale sampling of optical signals, application to high resolution spectroscopy -- Chapter 29: Ultrafast laser volume nanostructuring of transparent materials; from nanophotonics to nanomechanics -- Chapter 30: Nanofluidics fabricated by 3D femtosecond laser processing -- Chapter 31: Laser structuring for biomedical applications -- Chapter 32: Laser nanostructuring for SERS applications -- Chapter 33: Laser micro- and nanostructuring for refractive eye surgery. Bringing together contributions from leading experts in the field, this book reviews laser processing concepts that allow the structuring of material beyond optical limits, and methods that facilitate direct observation of the underlying mechanisms by exploring direct structuring and self-organization phenomena. The capacity to nanostructure material using ultrafast lasers lavs the groundwork for the next generation of flexible and precise material processing tools. Rapid access to scales of 100 nm and below in two and three dimensions becomes a factor of paramount importance to engineer materials and to design innovative functions. To reflect the dynamic

nature of the field at all levels from basic science to applications, the book is divided into three parts, Fundamental Processes, Concepts of Extreme Nanostructuring, and Applications, each of which is comprehensively covered. This book will be a useful resource for graduate students and researchers in laser processing, materials engineering, and nanoscience.

Sommario/riassunto