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Nota di contenuto	Chapter 1. Methods for measuring nonlinear optical properties -- Chapter 2. Theoretical models for describing an enhancement in nanoscale optical nonlinearities for applications design -- Chapter 3. Study on second- and third-order nonlinear optical properties in nanostructured carbon allotropes -- Chapter 4. Study on second- and third-order nonlinear optical properties in metallic nanoparticles -- Chapter 5. Study on second- and third-order nonlinear optical properties in semiconductors nanoparticles and quantum dots -- Chapter 6. Study on second- and third-order nonlinear optical properties in nanostructured systems: nanocrystals and complex

geometries -- Chapter 7. Applications, conclusions and perspectives.

Sommario/riassunto

This book provides readers with a detailed overview of second- and third-order nonlinearities in various nanostructures, as well as their potential applications. Interest in the field of nonlinear optics has grown exponentially in recent years and, as a result, there is increasing research on novel nonlinear phenomena and the development of nonlinear photonic devices. Thus, such a book serves as a comprehensive guide for researchers in the field and those seeking to become familiar with it. This text focuses on the nonlinear properties of nanostructured systems that arise as a result of optical wave mixing. The authors present a review of nonlinear optical processes on the nanoscale and provide theoretical descriptions for second and third-order optical nonlinearities in nanostructures such as carbon allotropes, metallic nanostructures, semiconductors, nanocrystals, and complex geometries. Here, the characterization and potential applications of these nanomaterials are also discussed. The factors that determine the nonlinear susceptibility in these systems are identified as well as the influence of physical mechanisms emerging from resonance and off-resonance excitations. In addition, the authors detail the effects driven by important phenomena such as quantum confinement, localized surface plasmon resonance, Fano resonances, bound states, and the Purcell effect on specific nanostructured systems. Readers are provided with a groundwork for future research as well as new perspectives in this growing field.