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| Nota di contenuto | Part I: Theory, Modeling and Synthesis. Chapter 1: Introduction to nanotechnology and nano-alloys -- Chapter 2: Introduction to nanomedicine; nanotechnology in medicine -- Chapter 3: Introduction to magnetic materials and their properties -- Chapter 4: Iron and iron oxide magnetic nanoparticles (IOMNs) -- Chapter 5: Synthesis of cobalt and its metallic magnetic nanoparticles (CMNs & CBMNs) -- Chapter 6: Synthesis of iron-based magnetic nanocomposites (IBMNs) -- Chapter 7: Synthesis of cobalt-based magnetic nanocomposites (CMNs & CBMNs) -- Chapter 8: Synthesis of iron-cobalt nanoalloys (ICNAs) and their metallic composites -- Chapter 9: Synthesis of core-shell |

magnetic nanoparticles (CS-MNs) -- Chapter 10: Synthesis of magnetoelectric multiferroic materials and their composites -- Chapter 11: Synthesis of magnetic carbon nanotubes and their composites -- Chapter 12: Manufacturing techniques of magnetic polymer nanocomposites -- Chapter 13: Vacuum based deposition techniques to synthesize magnetoelectric multiferroic materials -- Chapter 14: Theory, modeling, and simulation of magnetic hybrid nanoalloys -- Part II: Characterization techniques and applications. Chapter 15: Microscopy techniques -- Chapter 16: X-ray scattering techniques (XST) -- Chapter 17: Neutron scattering techniques (NST) -- Chapter 18: Light scattering techniques (LST) -- Chapter 19: Vibrating sample magnetometry (VSM) -- Chapter 20: Spectroscopic techniques -- Chapter 21: Rheological characterization -- Chapter 22: XPS, SIMS, and nanoSIMS -- Chapter 23: Thermal analysis -- Chapter 24: Contact angle studies -- Chapter 25: Electrical and dielectric characterization -- Chapter 26: Ageing studies -- Chapter 27: Diffusion and transport studies -- Chapter 28: Biological characterization -- Chapter 29: Industrial applications of magnetic alloy nanoparticles and their polymer nanocomposites -- Chapter 30: Agricultural applications of magnetic alloy nanoparticles and their polymer nanocomposites -- Chapter 31: Environmental applications of magnetic alloy nanoparticles and their polymer nanocomposites -- Chapter 32: Medicinal and biological application of magnetic alloy nanoparticles and their polymer nanocomposites -- Chapter 33: Life cycle analysis of specified magnetic alloy nanoparticles.

Sommario/riassunto

This comprehensive reference work satisfies the need for in-depth and multidisciplinary coverage of the current state of the art of magnetic hybrid nanoalloys (MHNAs) and their polymer and ceramic nanocomposites. MHNAs represent one of the most challenging research areas in modern science and technology. These materials are stiff and strong with remarkable electronic, mechanical, electrical, thermal and biocompatible properties, and a high potential for multifunctional applications ranging from industry to medicine. The peer-reviewed literature is already extensive, witnessing rapid progress in experimental and theoretical studies on fundamental properties as well as various advanced applications. Part 1 covers theory, modelling, and synthesis (growth and alloying mechanisms) of MHNAs. Formation mechanisms of magneto-electric multiferroic materials, magnetic carbon nanotube (CNTs), and perovskite materials, which are a novel class of next-generation multifunctional nanomaterials, are discussed. The second part focuses on characterization techniques for electrical and dielectrical, rheological, biocompatibility, and other properties, as well as applications in the industrial, agricultural, environmental, and biomedical sectors. Finally, life cycle assessment is considered as essential to the development of nanomaterials and nanoproducts from MHNAs. Advanced undergraduate and graduate students, researchers, and other professionals in the fields of materials science and engineering, polymer science, surface science, bioengineering, and chemical engineering will find comprehensive and authoritative information for solving fundamental and applied problems in the characterization and use of these multifunctional nanomaterials. .