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Nota di contenuto

Magnetic Resonance Microscopy; Contents; Preface; Editor's Biographies; List of Contributors; 1: Musings on Hardware Advances and New Directions; 1.1 Scope and Introduction; 1.2 NMR Building Blocks; 1.3 NMR of Short-T2 Samples; 1.4 Field Dependence of Signal Strength; 1.5 Sample Size Dependence; 1.6 Transmitter and Receiver Coils; 1.7 Shrinking Magnets; 1.8 Shrinking NMR; 1.9 Future Prospects; References; Part One: Novel Techniques; 2: Multidimensional Earth's-Field NMR; 2.1 Introduction; 2.2 Apparatus Developments; 2.2.1 Shimming and Screening; 2.2.2 Field Stabilization 2.2.3 Ultra-Low-Field Spectrometer2.2.4 Gradient Coil Design; 2.3 Applications; 2.3.1 Pulsed-Gradient Spin-Echo (PGSE) NMR; 2.3.2 Magnetic Resonance Imaging; 2.3.3 Multi-Dimensional Spectroscopy; 2.4 Conclusions and Future Outlook; Acknowledgments; References; 3: Multiple-Echo Magnetic Resonance; 3.1 Introduction; 3.2 MMME Technique; 3.2.1 Multiple Modulation Multiple Echoes; 3.2.2 Echo Shape and Amplitude; 3.2.3 Echo Phases; 3.2.4 Echo Sensitivity to Diffusion, Relaxation and Flow; 3.3 Diffusion Measurement; 3.3.1 One-Dimensional (1-D) Diffusion; 3.3.2 Two-Dimensional (2-D) Diffusion 3.3.3 Three-Dimensional (3-D) Diffusion3.4 Application: Flow; 3.4.1 One-Dimensional (1-D) Flow; 3.4.2 Three-Dimensional (3-D) Flow; 3.5 Summary; References; 4: Magnetic Resonance Force Microscopy; 4.1 Introduction; 4.2 MRFM Instrumentation; 4.3 Spin Manipulation in MRFM; 4.4 Imaging with MRFM; 4.5 Conclusions; Acknowledgments; References; 5: Dynamic Fixed-Point Generation Using Non-Linear Feedback Fields-with Applications in MR Contrast Enhancement; 5.1 Introduction; 5.2 Quantum Mechanical Derivation of Fixed Points; 5.3 Classical Derivation of Fixed Points; 5.4 Evolution of the Fixed Points 5.5 Applications5.6 Conclusions; References; 6: Shimming Pulses; 6.1 Introduction; 6.2 The Low Magnetic Field Regime; 6.2.1 Concomitant Fields and Berry's Phase; 6.2.2 Rotating-Frame Gradients; 6.2.3 Spatial Selectivity in Low Fields; 6.2.4 Coherent Averaging in Composite Selective Pulses; 6.2.5 Composite Selective Pulses; 6.2.6 Slice Selection in Low Fields; 6.2.7 Slice Selection in Zero Fields; 6.3 The Inhomogeneous Field Regime; 6.3.1 Slice Selection; 6.3.2 Restoring Spectroscopic Resolution; 6.4 Conclusions; Acknowledgments; References; Part Two: Polarization Enhancement 7: Parahydrogen-Induced Polarization in Heterogeneous Catalytic Hydrogenations7.1 Introduction; 7.2 Background; 7.3 PHIP Using Immobilized Transition Metal Complexes; 7.4 PHIP Using Supported Metal Catalysts; 7.5 PHIP-Assisted Gas-Phase Imaging and Studies of Hydrogenation Selectivity; 7.6 Conclusions; Acknowledgments; References; 8: Towards Posture-Dependent Human Pulmonary Oxygen Mapping Using Hyperpolarized Helium and an Open-Access MRI System; 8.1 Introduction; 8.2 Experimental; 8.2.1 Imager Design; 8.2.2 Hyperpolarized 3He Production and Delivery; 8.2.3 MRI Techniques 8.2.4 Human Imaging Protocol

Sommario/riassunto

This handbook and ready reference covers materials science applications as well as microfluidic, biomedical and dental applications and the monitoring of physicochemical processes. It includes the latest in hardware, methodology and applications of spatially resolved magnetic resonance, such as portable imaging and single-sided spectroscopy. For materials scientists, spectroscopists, chemists, physicists, and medicinal chemists.