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Nota di contenuto	CONTENTS; Preface; PART I INTRODUCTION; 1. Analysis, Design and Control of Complex Chemical Systems Alexander S. Mikhailov and Gerhard Ertl; 1. Introduction; 2. A Brief Historical Overview; 3. Recent Developments and Open Perspectives; References; PART II SINGLE MOLECULES, NANOSCALE PHENOMENA AND ACTIVE PARTICLES; 2. Imaging and Manipulation of Single Molecules by Scanning Tunneling Microscopy Leonhard Grill; 1. Introduction; 2. Imaging and Spectroscopy of Single Molecules; 2.1. Imaging single molecules; 2.2. Chemical identification by spectroscopy; 2.3. Imaging of diffusion processes 3. Manipulation of Single Molecules3.1. Manipulation without bias voltage; 3.2. Electron-induced manipulation; 3.3. Electric-field induced manipulation; 3.4. Lateral manipulation: Hopping vs rolling; 3.5. Vertical manipulation: Pulling single molecules from a surface; Acknowledgments; References; 3. Self-Organization at the Nanoscale in Far-From- Equilibrium Surface Reactions and Copolymerizations Pierre Gaspard; 1. Introduction; 2. Fundamental Aspects of Nonequilibrium Nanosystems; 2.1. Structure and function of nanosystems; 2.2. Out-of-

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4. Copolymerization processes; 4.1. Information processing at the molecular scale; 4.2. Thermodynamics of free copolymerization; 4.3. Thermodynamics of copolymerization with a template; 4.4. The case of DNA replication

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5. Nanomotors Propelled by Chemical Reactions Raymond Kapral; 1. Introduction; 2. Propulsion by Phoretic Mechanisms; 3. Microscopic and Mesoscopic Dynamics of Nanomotors; 4. Sphere Dimer Motors; Motor efficiency  
Motor dynamics in chemically active media

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## Sommario/riassunto

This review volume, co-edited by Nobel laureate G Ertl, provides a broad overview on current studies in the understanding of design and control of complex chemical systems of various origins, on scales ranging from single molecules and nano-phenomena to macroscopic chemical reactors. Self-organizational behavior and the emergence of coherent collective dynamics in reaction-diffusion systems, reactive soft matter and chemical networks are covered. Special attention is paid to the applications in molecular cell biology and to the problems of biological evolution, synthetic biology and design of

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