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Collana	Advances in Atom and Single Molecule Machines, , 2193-9705
Disciplina	620.5
Soggetti	Nanochemistry Microtechnology Microelectromechanical systems Surfaces (Physics) Atomic structure Molecular structure Physics Microsystems and MEMS Surface and Interface and Thin Film Atomic and Molecular Structure and Properties Applied and Technical Physics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Introduction: from the Anthycytera astronomical clock to molecular machinery -- From the Pascaline to a 5-digits metallic and planar miniature mechanical calculator 1 cm in lateral size -- Photo-microlithography fabrication of the parts of a micro-mechanical calculator -- Fabricating solid state gears at the nanoscale -- Prototypes of molecular gears with an organometallic piano-stool architecture -- Design and synthesis of a nano-winch -- Chemical anchoring of molecular rotors -- Anchoring molecular rotors by on-surface synthesis -- Transmission of Rotational Motion between Molecule-Gears -- A simple train of PF3 molecule-gears and its mechanics -- Modelling of Molecule-Scale Single Gears and Gear Trains -- Rotation of Adsorbed molecules induced by tunneling electrons --

Motion and Nanomechanical effects in Supramolecular Catalysts -- Five minutes in the life of a molecular shuttle: near-equilibrium measurements of shuttling dynamics with optical tweezers.

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Sommario/riassunto

This book presents mechanics miniaturization trends explored step by step, starting with the example of the miniaturization of a mechanical calculator. The ultra-miniaturization of mechanical machinery is now approaching the atomic scale. In this book, molecule-gears, trains of molecule-gears, and molecule motors are studied -one molecule at a time- on a solid surface, using scanning probe manipulation protocols and in solution as demonstrated in the European project "MEMO". All scales of mechanical machinery are presented using the various lithography techniques currently available, from the submillimeter to the nanoscale. Researchers and nanomechanical engineers will find new inspirations for the construction of minute mechanical devices which can be used in diverse hostile environments, for example under radiation constraints, on the surface membrane of a living cell or immersed in liquid. The book is presented in a format accessible for university students, in particular for those at the Master and PhD levels.

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