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Sommario/riassunto	Martin Oliver Steinhauser deals with several aspects of multiscale materials modeling and simulation in applied materials research and fundamental science. He covers various multiscale modeling approaches for high-performance ceramics, biological bilayer membranes, semi-flexible polymers, and human cancer cells. He demonstrates that the physics of shock waves, i.e., the investigation of material behavior at high strain rates and of material failure, has grown to become an important interdisciplinary field of research on its own. At the same time, progress in computer hardware and software development has boosted new ideas in multiscale modeling and simulation. Hence, bridging the length and time scales in a theoretical-numerical description of materials has become a prime challenge in

science and technology. Contents Definition of Shock Waves Multiscale Modeling and Simulation in Hard Matter Shock Wave Failure in Granular Materials Coarse-Grained Modeling and Simulation of Macromolecules Laser-Induced Shock Wave Failure in Human Cancer Cells The Future of Multiscale Materials Modeling Target Groups Researchers and students in the fields of (bio-)physics, computational science, materials engineering, materials science, computer science, polymer chemistry, theoretical chemistry, nanoscience Material scientists, engineers The Author Dr. Martin O. Steinhauser works as Senior Scientist and Principal Investigator at the Fraunhofer Institute for High-Speed Dynamics/Ernst-Mach-Institut (EMI) in Freiburg, Germany. .