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Nota di contenuto	Cover; Grain Boundaries and Crystalline Plasticity; Title Page; Copyright Page; Table of Contents; Preface; Chapter 1. Grain Boundary Structures and Defects; 1.1. Equilibrium structure of grain boundaries; 1.1.1. Geometric description and elements of bicrystallography; 1.1.2. Grain boundary structure in terms of intrinsic dislocations; 1.1.3. Grain boundary atomic structure - structural unit model; 1.1.4. Energetic atomic description; 1.2. Crystalline defects of grain boundaries; 1.2.1. Point defects - intergranular segregation; 1.2.2. Linear defects: extrinsic dislocations 1.2.3. Volume defects - grain boundary precipitation1.3. Conclusion; 1.4. Bibliography; Chapter 2. Elementary Grain Boundary Deformation Mechanisms; 2.1. Dislocation in close proximity to a grain boundary; 2.2. Elastic interaction between dislocations and grain boundaries: image force; 2.3. Short range (or core) interaction between dislocations and grain boundaries; 2.3.1. Geometric and energetic criteria for slip transmission; 2.3.2. Elementary mechanisms of dislocations at grain boundaries; 2.3.3. Atomic scale simulations of interaction mechanisms

between dislocations and grain boundaries
2.3.4. Experimental observations of interaction mechanisms2.3.5. Elastic stress fields associated with extrinsic dislocations; 2.4. Relaxation of stress fields associated with extrinsic dislocations; 2.4.1. Relaxation processes in a grain boundary; 2.4.2. Evolution of stress fields with relaxation time; 2.4.3. Experimental studies of grain boundary relaxation phenomena; 2.4.4. Conclusion; 2.5. Relationships between elementary interface mechanisms and mechanical behaviors of materials; 2.6. Bibliography; Chapter 3. Grain Boundaries in Cold Deformation; 3.1. Introduction
3.2. Plastic compatibility and incompatibility of deformation at grain boundaries3.2.1. General points; 3.2.2. Calculation of incompatibilities in a bicrystal; 3.3. Internal stresses in polycrystal grains; 3.3.1. Notions of crystalline plasticity, single crystal behavior for use in polycrystalline models; 3.3.2. Internal stresses in polycrystals; 3.3.3. Stress relaxation mechanisms; 3.4. Modeling local mechanical fields using the finite element method (FEM); 3.4.1. Aggregates; 3.4.2. From single crystal to polycrystal using finite transformations
3.4.3. Identification of the constitutive and hardening law parameters3.4.4. Examples of local mechanical fields proposed by the polycrystalline models; 3.5. Hall-Petch's law, geometrically necessary dislocations; 3.5.1. Definition; 3.5.2. Modeling the grain size effect in polycrystals, comparison with experiments; 3.6. Sub-grain boundaries and grain boundaries in deformation and recrystallization; 3.6.1. Deformation sub-boundaries and grain boundaries; 3.6.2. Recrystallization sub-grain boundaries; 3.7. Conclusion; 3.8. Bibliography
Chapter 4. Creep and High Temperature Plasticity: Grain Boundary Dynamics

Sommario/riassunto

This book explores the fundamental role of grain boundaries in the plasticity of crystalline materials, providing a multi-scale approach to plasticity to facilitate understanding. It starts with the atomic description of a grain boundary, moves on to the elemental interaction processes between dislocations and grain boundaries, and finally shows how the microscopic phenomena influence the macroscopic behaviors and constitutive laws. Drawing on topics from physical, chemical, and mechanical disciplines, this work also explains properties of deformation at low and high temperature, creep, fatigu