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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 precipitation 1.3. 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 mechanisms 2.3.5.

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Relaxation of stress fields associated with extrinsic dislocations; 2.4.1.

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materials; 2.6. Bibliography; Chapter 3. Grain Boundaries in Cold

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3.2. Plastic compatibility and incompatibility of deformation at grain

boundaries 3.2.1. General points; 3.2.2. Calculation of incompatibilities

in a bicrystal; 3.3. Internal stresses in polycrystal grains; 3.3.1. Notions

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3.4.3. Identification of the constitutive and hardening law parameters 3.

4.4. Examples of local mechanical fields proposed by the polycrystalline

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Dynamics

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## 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

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