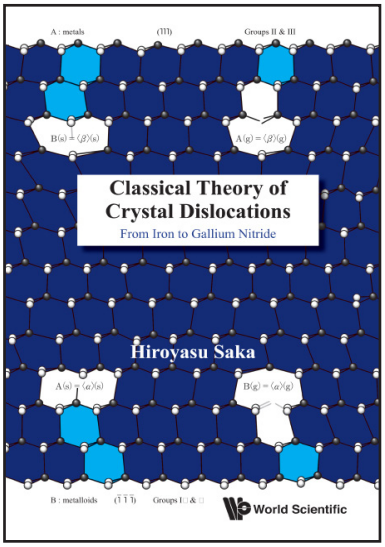
CLASSICAL THEORY OF CRYSTAL DISLOCATIONS
From Iron to Gallium Nitride

By **Hiroyasu Saka** (*Nagoya University, Japan*)



Key Features:

- The competing title is “Theory of dioslocations” by Hirth and Lothe: In this book, while fundamental aspects are fully described, nothing or only little is mentioned about functional materials such as GaN and SiC, nor about dislocations in a thin crystal such as epilayer, which is essential in modern semiconductor technology
- Many original pictures
- Many exercises, which the author found useful when he was teaching in Department of Materials Science and Engineering of Nagoya University to stimulate their interests in dislocation theory

Description:

The book consists of two parts: Part 1 is a standard text of dislocation theory. Mathematics is avoided as much as possible. Part 2 describes application of dislocation theory, which includes mechanical properties (including the inverse temperature dependence of strength) and dislocations in functional materials such as Si, GaN and SiC and dislocations in a thin crystal such as an epitaxial layer. This is what has been long anticipated among researchers in industry.

The book contains about 330 illustrations (mostly originals by the author) and the pictures obtained by the author by means of in-situ experiment in a transmission electron microscope over the past 50 years.

This book includes many exercises, which the author found useful when he was teaching in Department of Materials Science and Engineering of Nagoya University to stimulate their interests in dislocation theory.

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Readership: Graduate students, academics and professionals interested in disclocation theory, crystal dislocations.

Contents:

- The Fundamentals of Crystallography
- Geometry of Dislocations
- Fundamentals of Elasticity Theory
- Elasticity Theory of Dislocations
- Elastic Interaction Between Dislocations and Solute Atoms
- Motion of Dislocations (Peierls Force) and Multiplication (Frank-Read Source, Bardeen-Herring Source)
- Dislocation Groups
- Dissociated Dislocations in FCC Structure
- Dissociated Dislocations in HCP
- Dislocations in Ordered Alloys and Intermetallic and Inverse Temperature Dependence of the Strength
- Dislocations in Diamond, Zincblend and Wurtzite Structures and SiC
- Dislocations and Macroscopic Strength
- Dislocations in Thin Foils

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