DEFORMATION AND DISLOCATION IN FACE CENTERED CUBIC METALS ALUMNIUM, COPPER, NICKEL AND γ-IRON

NOTES FOR AN EXTENSION GRADUATE COURSE
PREPARED IN 1962*
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Hugh McQueen
Professor Emeritus
Mechanical and Industrial Engineering
Concordia University
Montreal, QC, H3G 1M8 Canada
mcqueen@encs.concordia.ca

* Hugh McQueen
Associate Professor
Department of Metallurgical Engineering
Ecole Polytechnique, Montreal

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H.J. McQueen, Associate Professor

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DISLOCATIONS: A WEB FORMAT MINI-COURSE

H.J. McQueen, Prof. Emeritus
Mech. and Ind. Eng., Concordia Univ., Montreal, H3G 1M8, Canada
mcqueen@encs.concordia.ca
(514-848-2424-ext.3145; fax 514-848-3175)

DISLOCATIONS (copyright 1975) started as a 38-min, 16 mm, animated film illustrating dislocations in action, with assistance of explanatory sound track (over). It fills the need for showing how moving dislocations produce their effects in a way that is not possible with still diagrams. It shows all possible mechanisms that can be portrayed in the simple cubic lattice that is the normal mode of illustration.

The production was carried out by a Concordia student team that was aided by the Center for Instructional Technology. The project received grants from Sigma Xi and ASM. Moreover, it was produced in a French version and also in a German one (*Institut fur Wissenschaftlichen Film, IWF).* It was transformed into a two-part video format in 1987. In total, up to 2002, Concordia has sold more than 100 copies; IWF continues to sell and loan copies. It has been transformed into a modern format and is made available freely as a contribution to the scientific community by the Faculty of Engineering and Computer Science of Concordia University.

The web site is set up like a mini-course to provide a high quality exposition of a significant, strictly defined subject. Because of its fundamental and non-mathematical exposition, it is too simple and limited for a complete graduate course in itself. Although dislocation theory is an important aspect of materials science, it seldom constitutes a stand-alone undergraduate course. The web site provides clear, fundamental knowledge for individual learning in association with courses in materials science, mechanical behavior and mechanical shaping.

In the format of a web-based course, the sound track text of each film section (referred to as bands) becomes a separate lesson. Each contains several still diagrams derived from frames of the film; these were issued originally as 35-mm slides. The pages contain links to the appropriate bands in the film animation and sound track.

http://users.encs.concordia.ca/~mcqueen/Dislocations_index.html

Alternately, go to the web site for Concordia University, Montreal, then to Mechanical Industrial Engineering, then to Hugh McQueen, then to Course Descriptions and finally to DISLOCATIONS.

THE SET OF 2 VIDEOS ARE STILL FOR SALE AT $US 100 OR $Can 100 with proceeds to Concordia accounts as previously.

ONE MUST SPECIFY THE FORMAT::: FOR NORTH AMERICA, VHS-NTC
: ::: FOR EUROPE,VHS-PAL or VHS-SECAM

PREFACE

This paper is directed towards metallurgical engineers who have not been closely associated with basic research. The object of the paper is to present a summary of the recent experimental results and theoretical developments related to the deformation of face centered cubic metals. Some relevant basic concepts of physical metallurgy are reviewed to ensure a common understanding and to reduce the need to consult other literature.

Furthermore, I am motivated to write this report by a desire to share my limited knowledge of a microcosm which I love. I love it for its beauty and its order which reflect in a small but brilliant way, the Goodness and Intelligence of its Creator.

In the preparation of this report, I am indebted to Noranda Copper Mills Ltd., particularly in the person of its Manager of Metallurgical Services, P.A. Scully. J. Precourt was a great aid in searching the bibliography, correcting the manuscript, and preparing the diagrams. My thanks also go to G. Gagnon, a colleague who contributed valuable advice; to L. Piperni, who prepared diagrams; and to the others who have aided me.

Hugh McQueen