

FESTKÖRPERPROBLEME

ADVANCES IN SOLID STATE PHYSICS 26



Walter Schottky
(Pretzfeld 1961)

**FESTKÖRPER
PROBLEME**

**ADVANCES IN
SOLID STATE
PHYSICS 26**

Plenary Lectures of the Divisions
"Semiconductor Physics"
"Dynamics and Statistical Mechanics"
"Low Temperature Physics"
"Magnetism"
"Metal Physics"
"Thin Films"
"Surface Physics"
"Vacuum Technology"
of the German Physical Society (DPG)

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Foreword

The year 1986 is the 100th anniversary of Walter Schottky's birth. In this volume O. Madelung has delivered a commemorative address on Walter Schottky, who had initiated this book series in 1953, at that time called "Halbleiterprobleme". He was the editor of the first four volumes. In addition he was the first chairman of the new subdivision "Halbleiterausschuß" – also founded in spring 1953 – of the German Physical Society. This has been the origin of the modern structure of our society: the organization in subdivisions, called "Fachausschüsse".

The first volumes show the spirit of Walter Schottky: he was the author of many original contributions and has written many comments on the contributions of the other authors. His concept was to edit a series of books which could serve as a compendium in modern semiconductor physics and technology. For this purpose he looked for authors willing to prepare papers by which the other members of the subdivision could be informed and introduced in the quickly developing field. He trusted in his books not to become obsolete too fast.

I hope the following editors will hold Schottky's estate well – I know they have done their best so far: they have never forgotten Walter Schottky's idea to integrate semiconductor physics and technology in the work of our subdivision. On the other hand we know about the fact that the tremendous progress in semiconductor technology allows our subdivision only to cover a very narrow sector during our annual meeting.

The second contribution to this volume is dedicated to the Quantum Hall Effect. G. Landwehr reports on K.v.Klitzing's hard and consequent work up to the time when he was awarded the Nobel prize. K.v.Klitzing gave an outline of his effect in this series on volume XXI, when he obtained the W. Schottky prize in 1981.

The winner of the W. Schottky prize of 1986 is G. Abstreiter. His contribution to this volume concerns the diagnostics of the 2-dimensional electron gas by light-scattering methods.

In the next three papers topics are considered in which W. Schottky has been engaged, too: excitons, lattice defects in semiconductors, and the Schottky-contact. These papers are presented as a retrospect on Schottky's scientific work and its present actuality.

Further articles of the volume report on the impact of methods of statistical mechanics on the physics of condensed matter: an introduction to the importance of fractal structures, an article on Monte-Carlo calculations to explain phase diagrams of alloys, and another one about macroscopic quantum phenomena as observed in Josephson-junctions.

The contribution of E. Haller is dedicated to another birthday celebrant of 1986: 100 years ago the element Germanium was discovered, one of the most important semiconductor materials, the "father of silicon". Its renaissance today is due to the fact that ultrapure material is available now. — H. Krenn reports upon a sophisticated memory mechanism to establish the light-induced magnetization in semi-magnetic semiconductors.

Three papers concern the physics and application of heterostructures: the electronic structure near the chemical discontinuities, optical methods to diagnose profiles of inhomogeneities, and another one the electron transport in those structures.

The last three contributions deal with applications of semiconductors. E. Schöll has analysed origin and rise of field domains and current filaments in hot electron systems by methods of non-linear dynamics. W. Richter reports upon the mechanisms of the Metal-Organic Chemical Vapour Deposition technique (MOCVD), a procedure in competition with the Molecular-Beam Epitaxy (MBE) in preparing III-V heterostructures. The very last paper is again presented in memoriam Walter Schottky: R. Sittig discusses the application of semiconductors in high-power devices, a field also covered by Schottky's interest in engineering problems.

This year the annual spring meeting of the "Arbeitskreis Festkörperphysik" of the German Physical Society was organized together with the Dutch Physical Society (Nederlandse Natuurkundige Vereniging, NNV) and the Austrian Physical Society (Österreichische Physikalische Gesellschaft, ÖPG). We thank our European neighbours for their active and passive collaboration. They are always welcome to us. Moreover we thank very much the local organizing committee: Dr. H. Hinsch and his coworkers.

The editor of this volume wants to thank all the authors for their collaboration at the conference and their effort in preparing the manuscripts. Especially this year they have been in time! I thank the publisher, in particular Mr. B. Gondesén, for the extraordinary and kind team-work, and Mr. E. Gerlach for reading the manuscripts during the conference. Most of all I thank Mr. J. Brunn. He has assisted me in editing the volume right from the beginning up to the very end as a lector, a corrector, and an advisor. I think, also the authors are obliged to thank him for his accurate and continual engagement.

Aachen, June 1986

Peter Grosse

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