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Electronic Conduction in Oxides

Second, Revised and Enlarged Edition
With 199 Figures and 13 Tables

Springer

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ISSN 0171-1873
ISBN 978-3-642-08627-4

Library of Congress Cataloging-in-Publication Data
Denki dendosei sankabutsu. English.
Electronic conduction in oxides / N. Tsuda ... [et al.].– 2nd rev. and enl. ed. p. cm. – (Springer series in solid-state sciences, ISSN 0171-1873 ; 94) Includes bibliographical references and index.
ISBN 978-3-642-08627-4 ISBN 978-3-662-04011-9 (eBook)
DOI 10.1007/978-3-662-04011-9
1. Energy-band theory of solids. 2. Free electron theory of metals. 3. Oxides-Electric properties. 4. Electric conductivity. I. Tsuda, N. (Nobuo), 1936- II. Title. III. Series.
QC176.8.E4 D3813 2000 530.4'12–dc21 00-041925

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© Springer-Verlag Berlin Heidelberg 1991, 2000
Originally published by Springer-Verlag Berlin Heidelberg New York in 2000
Softcover reprint of the hardcover 2nd edition 2000

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Typesetting: Data conversion by A. Duhm
Cover concept: eStudio Calamar Steinen
Cover production: *design & production* GmbH, Heidelberg

SPIN: 10744868 57/3141/tr - 5 4 3 2 1 0 – Printed on acid-free paper

Preface to the Second Edition

This is a revised version of the first edition published in 1991. At the same time, this is a revised version of the Syokabo edition, which was written in Japanese and published in 1993 as a revised version of the original edition published in 1983.

Compared with the first edition, the following revisions have been made: a new chapter on electron–electron interaction has been prepared by a new co-author A. Fujimori. The substances in the previous Chap. 4 have been changed, and $La_{1-x}Sr_xMnO_3$ substituted for V_2O_3, which has been extensively reviewed in *Reviews of Modern Physics*, Vol. 70, p. 1039 (1998) by M. Imada, A. Fujimori and Y. Tokura. Section 4.6, NiO, was rewritten by A. Fujimori. The other chapters have also been revised by each author to accommodate new developments which have appeared since the publication of the first edition.

As a result, the references have been increased from 1088 to 1293, and 83 figures are new or improved.

The authors are: N. Tsuda for Chaps. 1, 2 and Sects. 5.1–5.5 and 5.9, K. Nasu for Chap. 2, A. Fujimori for Chap. 3 and Sects. 5.6 and 5.7, and K. Siratori for Sect. 5.8.

The authors would like to express their gratitude to many authors and publishers for allowing them to reproduce their diagrams, and to H.K.V. Lotsch and C.E. Ascheron for their encouragement to complete this book. The authors are indebted to S. Lyle for having improved the English, and to Mrs. P. Treiber for her cooperation in the production process. Especially, they are indebted to Ms. A. Duhm for all her efforts to complete this book. Thanks are also to S. Makiya of Syokabo for his cooperation. Without their help, this book could not have been accomplished.

Finally, we acknowledge, with thanks, the authors of all the papers referred to in this book.

Tokyo, Tsukuba — *N. Tsuda, K. Nasu*
Tokyo, Narasino, July 2000 — *A. Fujimori, K. Siratori*

Preface to the First Edition

This book is a revised and up-dated translation of *Denki Dendōsei Sankabutsu* (Electronic Conduction in Oxides) published by Shokabo in Tokyo in 1983 as the second volume in the Material Science Series, which was edited for postgraduate students by T. Suzuki, S. Chikazumi, and S. Nakajima.

Since the publication of the first edition, we have witnessed the historic discovery of high-T_c superconductors by J.G. Bednorz and K.A. Müller. The Shokabo edition has thus been thoroughly revised to accommodate the recent developments, and K. Nasu joined as the fourth author.

The book is compiled as follows: After a short introductory chapter, Chap. 2, written by Tsuda, is devoted to a brief review of transport phenomena and electronic states in oxides. In Chap. 3, electron–phonon and electron–electron interaction are treated theoretically by Nasu and Yanase. Nasu discusses the present status of theoretical studies of the electron–phonon interaction in solids and Yanase explains the electron correlation. Chapter 4 treats the physics of various representative oxides in detail. Sections 4.1–4.5 and 4.10 were written by Tsuda and Sects. 4.6–4.9 by Siratori. This chapter is intended not as an exhaustive review of the properties of each oxide, but rather as an illustration of the concepts which have developed out of the research into transport phenomena in conductive oxides. Many of these concepts are due to N.F. Mott. At the end of Chap. 4, the properties of high-T_c oxides are reviewed by Tsuda. The reader is kindly asked to forgive the inevitable omission of certain important works in this field.

The authors would like to express their gratitude to H.K.V. Lotsch for his encouragement to complete this book and to A.M. Lahee for improving the manuscript. One of the authors (KS) is indebted to D. Ihle for his valuable comments on Sect. 4.8.

Finally, we acknowledge with thanks the authors of all the papers referred to in this book.

Tokyo, Okazaki — *N. Tsuda, K. Nasu*
Sakai, Toyonaka, October 1990 — *A. Yanase, K. Siratori*

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