are provided. I found that on the important issue of pulse amplification requirements, the book considers briefly only the special (but very exciting) case of solitons and misses the many problems associated with general pulse amplification.

The third and final section of the book, on applications, is primarily concerned with some of the up-to-date linear and nonlinear communication systems and local area networks and the enormous impact that EDFAs have had on their successful implementation. The significance of the EDFAs in optically preamplified receivers is stressed. The most significant digital (linear) and soliton (nonlinear) system experiments performed to date are also reviewed. Limitations imposed on linear systems by fiber nonlinearities and dispersion are briefly mentioned. The ground that Desurvire sought to cover in the third part is quite diverse and could well have been the subject of several separate volumes. Therefore, its inclusion in this book is inevitably of a review type. However, the book clearly points out how and to what degree these applications are benefited or enhanced by EDFAs.

Overall the book gives one of the most comprehensive and detailed accounts of the physics and fundamental principles of erbium-doped fiber amplifiers published so far. I have not the slightest doubt that the book will be of great help to all scientists and engineers working in the field who are struggling to understand EDFAs. The unified and in-depth presentation of the subject will benefit in particular researchers and graduate students who are dealing with problems involving optical amplification. The book imparts the fundamental concepts quite skillfully and can be used as collateral reading. The sections dealing with modeling and the entire second part could well be used in undergraduate courses. I do not hesitate to recommend the book enthusiastically to anybody having an interest in EDFAs and their applications.

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The Surface Science of Metal Oxides

V. E. Henrich and P. A. Cox
Cambridge U. P., New York, 1994.
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Metal oxide surfaces are as interesting as they are complex. The surface properties of metal oxides play a

major role in such diverse fields as catalysis, development of gas sensors, sintering of ceramics, passivation of metals against corrosion and high-T_c superconductivity. Most metals have a wide variety of oxide phases, with differing stoichiometries, oxidation states, electronic properties and crystal structures. No surface is ever perfect, but small amounts of defects may even dominate some properties of a metal oxide surface, since a change in the local geometry and stoichiometry may cause a change in the local electronic structure. Surface preparation is a crucial element for any experiment on surfaces, but it is especially critical for metal oxides.

The above paragraph summarizes the introduction to the new book by Victor E. Henrich and P. A. Cox, *The Surface Science of Metal Oxides.* Both authors are recognized experts on metal oxides: Henrich has worked extensively with metal oxide surfaces, and many examples in the book are drawn from his experience; Cox wrote a book on the bulk properties of transition metal oxides, *Transition Metal Oxides: An Introduction to Their Electronic Structure and Properties* (Clarendon, 1992).

The Surface Science of Metal Oxides deals almost exclusively with the basic properties and behavior of surfaces of well-characterized and mostly single-crystal samples. It gives a detailed and thorough account of the geometric, vibrational and electronic structures of the most common faces of various metal oxides as well as their interaction with adsorbates and overlayers. The authors have made great efforts to systematize their knowledge of the subject. This is particularly beneficial in the long chapter on molecular adsorption, where they categorize by adsorption mechanisms, by adsorption behavior for specific molecules and by adsorption on different oxide surfaces, before discussing specific systems in detail.

Since surface scientists tend to forget what is underneath the fascinating first couple of atomic layers, the authors' excursion into the bulk electronic structure of metal oxides that precedes the discussion of surface electronic structure is both refreshing and enlightening. (Spoiled by this, I would have wished an equally tutorial introduction for the part on the geometric structure.) Another strength of *The Surface Science of Metal Oxides* is the way it deals with the rapidly growing literature in the field. The close-to-1000 references are mostly organized in tables, saving the reader from being swamped in details and facilitating digging into the original literature if needed. The authors also say what is *not* known about metal oxide surfaces—information that is often almost as valuable as what is known.

The book will be a useful resource for physicists, chemists and materials scientists; some background in surface-science methods is needed to take full advantage of the information given. It certainly has a prominent place on my bookshelf, and I highly recommend it for anyone writing a paper, thesis or proposal on metal oxide surfaces.

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