noes. Now it is a vast endeavor including the physics and chemistry of active volcanism and paleovolcanism, and it is all the more important these days with the realization that the ocean floors are pretty well entirely volcanic and that many industrial raw materials are volcanogenic. This book does not cover all aspects of volcanic rocks; as its subtitle indicates, it deals only with petrological and structural aspects. It achieves what no other book on volcanic rocks has done; it gives a thorough analysis of the geochemistry, mineralogy, and petrology of volcanic materials in plate-tectonic terms. Breathtaking accounts of Mount Pelée and Vesuvius are not part of this book.

The book has an air of refreshing simplicity, and the numerous informative maps, tables, and graphs give clear evidence of the thoroughness of the authors. A curious exception is figure VII-6, where western Africa and the eastern United States have swapped symbols and several black blobs appear without explanation, one intriguingly having a large question mark by it.

The first half of the book is the best part of it. Girod begins by saying the book is intended to fill the gap between the primary publications in journals and the general reviews found in many textbooks. It fills that gap well.

Girod has written three of the nine chapters himself and has done an excellent job of coordinating the others. Most of the chapters are written in a clear and straightforward style, and there are plenty of headings to help locate the topic one is chasing. Most of the book is given over to the distribution, geographical and geochemical, of the tholeiitic, calc-alkaline, alkaline, and shoshonitic series in relation to plate tectonics. This is well discussed, with a fund of geochemical and other data being brought to bear. The petrogenetic schemes for magmas within plates, along major fractures, and at accreting and subducting plate margins are neatly documented. A. E. Ringwood's opinions are well expounded by the contributors, but I am sorry that R. W. Johnson's recent authoritative opinions on Australasia's volcanism could not be included. There is a good account of the vital role of experimental petrology, putting phase diagrams, thermal barriers, effects of pressure, and all the principles of silicate phase relations in a French nutshell. And there are useful compilations of the distribution of the rare earth elements, isotopes, and mantle-type nodules. It is a pity that all the pyroclastic rocks are not covered; instead only the ignimbrites are described, and in detail. A novel but not too successful account of magmatic contamination is also included.

The index is rather weak, which is surprising considering the thoroughness of the rest of the book. The book has its omissions. No reference is made to the recent work on Etna and Vesuvius, or the moon, but what is really disappointing to me is the almost total lack of mention of the Hebridean province. It does not seem to find a home in the "cadre structural."

Les Roches Volcaniques is well printed in clear type on good-quality paper. The pages are sewn and the book should hold together for years even though it is a paperback.

I cannot think of a better book on magmatic provinces, which to me are the key to modern petrology. The book should have a world market and be read by all students, but its being entirely in French may cause difficulties. Despite the effort, it is well worth reading, and all my students will be encouraged to do so.

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Surface Physics

Photoemission and the Electronic Properties of Surfaces. B. FEUERBACHER, B. FITTON, and R. F. WILLIS, Eds. Wiley-Interscience, New York, 1978. xviii, 540 pp., illus. $48.

Photoemission spectroscopy has enjoyed a tremendous growth in the last two decades yet there is no book that approaches definitive coverage of the subject. The very richness that makes photoemission such a productive and popular subject of research makes a unified view of the subject hard to reach.

Under these circumstances, several aspects of the book under review make it particularly valuable. The book, which is a collection of 17 chapters by 29 authors, gives a many-faceted view of the subject, and, by emphasizing the use of photoemission to study the electronic properties of surfaces both clean and with sorbed atoms, it remains tractable in size. In addition, sufficient coverage of bulk photoemission is given to bring its rather close relationship with surface photoemission into proper perspective.

The strongest aspect of the book is in the collection of theoretical chapters (constituting approximately half the book). This group of chapters alone makes the book essential for any student of or researcher in photoemission. The prospective reader should be warned, however, that a good knowledge of quantum mechanics is necessary for complete understanding of these theoretical papers, although the authors generally do a good job of explaining their results in physical as well as mathematical terms.

Unfortunately, only five chapters are directly concerned with experimental results of photoemission related to surfaces. This is simply insufficient space to treat such a large body of work and to give proper perspective. The chapters that are most useful are those in which the authors discuss their own work without attempting to cover a whole field. I was particularly struck by the chapter by Smith and Larsen, in which they present experimental data on angle-resolved photoemission from $TaSe_2$ and discuss a succession of models with which they and others have attempted to explain the data as they became more complete.

In contrast, the chapter by Gudat and Eastman attempts to give the reader a comprehensive view of photoemission from semiconductor surfaces, a demanding and broad subject that is impossible to cover adequately in a 40-page chapter. The chapter also gives evidence of haste in writing. For example, the work of Harrison and co-workers is mentioned but Harrison is not an author of either reference cited. And there is no discussion of the work of Bauer *et al.*, which gives new perspective on the final states in the surface excitons that are discussed at length by Gudat and Eastman. In fact, the large amount of work in which core states and synchrotron radiation are used is very poorly covered.

Several omissions or misconceptions are repeated with sufficient frequency that they should be mentioned. Although the excellent work of Gobeli and Allen is often recognized in the book, the equally important contemporary work of Scheer and van Laar is ignored. Too often, the photoemission is assumed to come from within only the last 5 or 10 Å of the solid, whereas that is the case only in restricted energy ranges. At high energy, a one-to-one correspondence is drawn between photoemission yield and optical absorption. As has been shown, this is a special case, not a general one.

Despite these rather understandable shortcomings, this is probably the best single treatment of photoemission available. Certainly, it is the best treatment centered on surface studies.

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