

Sears, D.W.G. (1989b) Cathodoluminescence of geological materials, by D.J. Marshall. *Geochim. Cosmochim. Acta*, **53**, 1712 (Book review).

Cathodoluminescence of Geological Materials edited by D. J. Marshall. Unwin Hyman, 1988, 146p., \$95.00 (ISBN 0-04-522026-7).

THIS IS A beautifully produced book, in quarto format and with 12 spectacular pages of color photographs. There are 9 chapters, the first of which is an introduction to the phenomenon along the lines of a highly simplified undergraduate inorganic text; the second is a very skimpy historical chapter, while the third describes instrumental aspects of CL studies in some detail. The fourth deals with "common minerals" sorted into classes: native elements, sulfides, oxides/hydroxides, halides, carbonates/nitrates/borates, sulfates/chromates/molybdates/tungstates, phosphates/arsenates/vanadates, and silicates. Chapters 5, 6 and 7 deal with feldspar, quartz and carbonates, respectively. The sixth is a self-contained chapter by Anthony Mariano which deals with a few topics relevant to non-sedimentary rocks; rare earth elements in apatite, fluorite, strontianite, and calcite, a section on feldspars, and a discussion of zoning. Mariano's chapter, which contains much previously unpublished research, is a book within a book and repeats much that can be found elsewhere. It stresses the value of CL spectra, which can be particularly useful when rare earth elements are the activators because the *f* orbitals are shielded from the crystal field by *s* electrons and therefore produce lines rather than broad spectral peaks. A final three-page chapter briefly summarizes the CL properties of meteorites, lunar samples and gemstones. For most *Geochimica et Cosmochimica Acta* readers, the brevity of this chapter will be a disappointment.

For many years D. J. Marshall has worked for the manufacturers of arguably the most popular device for observing the cathodoluminescence of minerals. As such, his contact with the field is primarily

through technical developments and providing tutorials for purchasers. This is worth noting because it sets the tone of the book. The book is authoritative on technique, contains abundant and most useful CL photographs, and is a veritable catalog of facts. Unfortunately, it is also light on the synthesis of those facts and their application to geologically interesting problems (a noteworthy exception to this is Mariano's section on fenitization), and it tends to reproduce information uncritically. A disproportionate amount of information quoted is based on personal communications or is previously unpublished, and it is clear that some of the material has not suffered the scrutiny of good reviewers. But no matter. As a reference source of CL color photographs which could help in the interpretation of CL images produced by others with geologically interesting problems, the book is without equal. It can similarly be said that nowhere else is there a comparable source of CL spectra, although this is one place where the lack of a detailed synthesis is a problem.

Cathodoluminescence petrography is far more than a toy for the amusement of idle minds. In the right hands it can provide deep insights into the composition and the structure of key minerals and their petrogenesis. This book may not be the ultimate source material for the subject, and a major detailed synthesis is still needed, but it is the best we have to date, and it should find a useful place on the shelves of most active mineral chemists and many petrologists.

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