Sears, D.W.G. (1986d) Thermoluminescence of Solids by S.W.S. McKeever. *Geochim. Cosmochim. Acta*, **50**, 2121. (Book review.)

BOOK REVIEWS

Thermoluminescence of Solids by S. W. S. McKeever. Cambridge University Press, 1985, 376 p., $69.50.

THE STUDY OF the thermoluminescence (TL) of solids is an ancient one, the writers of ancient Greece made reference to it and Robert Boyle described a series of experiments, including an often cited study in which he took a diamond to bed and watched it glow as he placed it on "warm parts" of his body. McKeever's book covers all aspects of the TL phenomenon, reflecting the diversity of the author's research (solid state physics, dosimetry phosphors and meteorites). The book deals with theoretical work on the nature of the TL mechanism, the kinetics of the TL decay process and various complexities, the relevant solid-state chemistry and TL instrumentation. There are chapters devoted to the three major TL applications: dosimetry, pottery dating (with a few pages on dating geological and biological materials) and geological applications.

It is the chapter on geological applications, which is broken down into meteorites, lunar material and terrestrial samples, that I found of most interest. The levels of natural TL in a meteorite are governed by an equilibrium between build-up due to exposure to ionizing radiations and decay due to the thermal drainage. Thus cosmic ray exposure and shielding effects, orbital changes and arrival on earth, all of which result in changes of thermal or radiation environment, can affect natural TL levels. The amount of TL that can be induced in a given sample, and its emission characteristics, are governed by the nature and amount of the mineral producing the TL, usually feldspar. Thus processes such as shock, which converts the feldspar to maskelynite, or metamorphism which creates feldspar from primary igneous glass, can be followed precisely with TL. Lunar studies tended originally to be concerned with the possibility that certain luminescence phenomena observed on the Moon were due to TL of the surface materials, but later studies concerned thermal gradients in the Moon's regolith, and physical and mineralogical aspects of lunar TL. Terrestrial applications have been numerous and diverse, and McKeever singles out shock effects associated with crater material, palaeothermometry and prospecting for particular attention.

The book is well produced, the illustrations are numerous and clearly prepared. One of the appendices, a list of mineral names and formulae, is too skimpy to be worthwhile and the author sometimes has an awkward, self-conscious writing style; the few words that round-off the geological applications chapter are thoroughly confused, for instance. Nevertheless, it is a most valuable addition to the literature and essential reading for anyone interested in the physical properties of minerals. I have made good use of my copy many times, and I have usually had to recover it from a colleague.

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