

SPECTROSCOPY, LUMINESCENCE AND RADIATION CENTERS IN MINERALS
by A. S. Marfunin, Translated by V. V. Schiffer, Springer-Verlag, 1979, 170 figs., 22 tables,
x, 352 pages, \$ 59.40.

This is an English translation of the original in Russian by Prof. Arnold S. Marfunin, published in 1975 by Nedra, Moscow.

Seven broad subjects are reviewed in this book, namely Mössbauer spectroscopy; x-ray and x-ray electron spectroscopy; electron paramagnetic resonance; nuclear magnetic resonance and nuclear quadrupole resonance; luminescence, thermoluminescence and radiation electron-hole centres in minerals. These subjects are of topical interest to a student of mineralogy; hence the book is welcome.

The lay-out of the chapters follows the sequence, the principle behind the technique, methodology and geological applications.

Following this format, the basic principles, the useful nuclei and the experimental parameters which influence Mössbauer spectra are dealt with clarity in the first chapter. Its application for the complete characterisation of the 'ferrous state' in the minerals and rocks is then presented. The details cover the bivalency of iron, coordination, type of bonding and the distribution of Fe^{+2} and Fe^{+3} in various rock forming silicates. While the coverage of Mössbauer spectroscopy of iron is good, there is only a mention of tin-119 as a nuclide, possibly for the obvious reason of limited actual application.

X-ray analysis is not a new subject to geology, but x-ray electron spectroscopy is. The inter-relationship amongst the different approaches and their use in geochemistry are brought out with a number of illustrations. Application of electron spectroscopy for chemical analysis (ESCA) in the study of chemical bonding in minerals is indicated.

The contribution that Nuclear Magnetic Resonance in the elucidation of various types of 'water' and its mobility in crystals has been brought out in this chapter. With the advent of high resolution NMR for solids, the mineralogists will find the NMR technique to be useful for their research. Data on various minerals using NMR and NQR are listed which will be useful for the workers in the field.

The theory of luminescence for the understanding of the various processes has been discussed thoroughly using the energy levels diagrams and with very many illustrations. The process of sensitisation and quenching in luminescence has been dealt with in this book giving many examples. Various methods of luminescence excitation have been described and the luminescence spectra due to elements present in various minerals are presented and will be useful as a reference for mineralogists.

Experimental data on T.L. of various minerals are given, indicating the possible application in geology.

The final chapter on Radiation Electron-Hole Centres in minerals is a beautiful exposition of the application of physical concepts developed in the study of colour centres of man made crystals to minerals in nature.

In general, this book is very useful and can be a guide for mineralogists.

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