



# Mössbauer Effect in Lattice Dynamics: Experimental Techniques and Applications

By Yi-Long Chen, De-Ping Yang

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This up-to-date review closes an important gap in the literature by providing a comprehensive description of the Mössbauer effect in lattice dynamics, along with a collection of applications in metals, alloys, amorphous solids, molecular crystals, thin films, and nanocrystals. It is the first to systematically compare Mössbauer spectroscopy using synchrotron radiation to conventional Mössbauer spectroscopy, discussing in detail its advantages and capabilities, backed by the latest theoretical developments and experimental examples. Intended as a self-contained volume that may be used as a complete reference or textbook, it adopts new pedagogical approaches with several non-traditional and refreshing theoretical expositions, while all quantitative relations are derived with the necessary details so as to be easily followed by the reader. Two entire chapters are devoted to the study of the dynamics of impurity atoms in solids, while a thorough description of the Mannheim model as a theoretical method is presented and its predictions compared to experimental results. Finally, an in-depth analysis of absorption of Mössbauer radiation is presented, based on recent research by one of the authors, resulting in an exact expression of fractional absorption, otherwise unavailable in the literature. The whole is supplemented by elaborate appendices containing constants and parameters.

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### Editorial Review

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About the Author

De-Ping Yang is Deputy Chair of the Physics Department of the College of the Holy Cross, MA, USA.

Yi-Long Chen is Professor of Physics at the Wuhan University, China.

The authors have research experience at various international institutions, including the MIT.

They have gained solid knowledge in investigating materials with various physical methods, e.g. using NMR and synchrotron radiation.

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