



# **Rare-Earths and Actinides in High Energy Spectroscopy (Progress in Theoretical Chemistry and Physics)**

*Christiane Bonnelle, Nissan Spector*

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## **Rare-Earths and Actinides in High Energy Spectroscopy (Progress in Theoretical Chemistry and Physics)** Christiane Bonnelle, Nissan Spector

This unique monograph covers recent theoretical and experimental results on the complex character of f electrons in materials containing lanthanides (rare earths) or actinides, such as alpha-cerium and delta-plutonium. It answers the urgent need for a general presentation of the body of experimental and theoretical results presently available in this challenging domain. Some of the fast developing applications of lanthanide and actinide materials are mentioned.

Materials containing atoms with an open f shell have electronic and crystalline properties that are controlled by the localized or delocalized character of the f electrons. This book gives a theoretical discussion of the various spectroscopic methods that shed light on the character of the f electrons and on the connection between their localization and the properties of these materials.

Part 1 covers the characteristics of the f electrons in atoms and solids and includes a discussion of the properties of lanthanides and actinides in connection with the f electrons.

Part 2 describes the various spectroscopic methods that are used to establish the electronic distributions and energies of the states. Examples involve the determination of f electron distributions by high energy spectroscopy methods with separate treatment of the valence and core electrons.

Part 3 concentrates on the theoretical treatment of electronic transitions involving f

electrons and simulations of the lanthanide spectra, including comparison with the available experimental data.

Part 4 discusses the localized or delocalized character of the f electrons in actinides and their compounds, including comparison (analogies & differences) between the 4f and 5f electron materials.

This monograph should be of great value for researchers, academics and engineers working in the fields of high energy spectroscopy, electronic and nuclear science and technology, as well as materials involving rare earths and radio-elements.

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