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PAC Spectroscopy: A technique to characterize materials at an atomic scale

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Abstract

Nuclear hyperfine methods (like Mössbauer effect (ME), nuclear orientation (NO), nuclear magnetic resonance (NMR), nuclear quadrupole resonance (NQR), electron spin resonance (ESR) and perturbed angular correlation/distribution (PAC/PAD)) have received distinguished recognition in solid state material research, providing information on the local environment by observing the interaction between nuclear moments (electric quadrupole moment and magnetic moment) and local fields (electric field gradient and magnetic field) arising from the extra-nuclear electronic charge and spin distributions in the crystal lattice. However, because of the unique features of PAC spectroscopy, its potential to obtain atomic scale information about the formation, identification and lattice environment of defects and/or defect complexes in various materials is enormous. Here, on the basis of measured electric field gradient and hyperfine magnetic field, we demonstrate the presence of various defects in variety of materials ranging from insulators to semiconductors to metals.

Biography

Rakesh Dogra, Professor of Physics and 45 years old, has completed his Ph.D. degree from Punjab University, Chandigarh and postdoctoral studies from IPEN, Sao Paulo and Australian National University, Canberra. At present, he is actively involved in synthesizing and characterizing phosphor materials. He has published more than 30 research articles in International Journals of repute.