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EFG Component Distribution Functions in Inhomogeneous Broadening in PAC Spectroscopy MIKE ADAMS, P. MATHESON, W.E. EVENSON, Utah Valley University, M.O. ZACATE, Northern Kentucky University — Perturbed Angular Correlation (PAC) spectroscopy is used to study the distribution and mobility of defects within crystals. The angular correlation of multiple gamma rays emitted from probe nuclei, affected by the net electric field gradient (EFG) in a probe's vicinity, are used to produce the PAC spectrum, $G_2(t)$. The distribution of EFGs from many random defects in a crystal, results in inhomogeneous broadening (IHB) of $G_2(t)$. Our EFG component probability distribution functions are found by summing 20,000 net EFGs, each found from taking a random distribution of vacancies of a particular concentration, combined with a single trapped vacancy in a near neighbor position to a probe nucleus. The derived EFG component distributions allow us to reconstruct the $G_2(t)$ as a function of defection concentration. The EFG component distribution functions are characterized by weighted sums of either Gamma, Lorenztian or Gaussian distributions. A systematic change in the type and number of distribution functions required to model IHB is apparent as defect concentration increases. In particular, the EFG distributions become increasingly skewed with increasing defect concentration. Results for the EFG components in simple cubic (SC), face-centered cubic (FCC) and body-centered cubic (BCC) lattices are presented.

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