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ASYMMETRY AND DISTORATION OF THE ELECTRON PARAMAGNETIC RESONANCE PROFILE IN TMMC: CU AT GENERAL TEMPERATURE

Nazir Shah
Department of Physics, University of Peshawar.

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ABSTRACT

We present an experimental study of the asymmetry in the electron paramagnetic resonance (EPR) line shape in one dimension magnetic system. The system studied is Tetramethylamonium Manganese trichloride (TMMC), and TMMC doped with different concentrations of Cu^{2+} ions. We have measured several parameters regarding the symmetry of the EPR line shape about the resonance position. These are the ratios of the I^+/I^-, I'^+/I'^+, $\Delta H^+/\Delta H^-$ and $\Delta H'^+/\Delta H'^-$ were I and I' are the amplitudes of the maxima of the first and second derivatives of EPR absorption line. ΔH is the linewidth with respect to the resonance, position and where $d\chi/dH$ has extremum. ΔH is the width with respect to the resonance position and where $d^2\chi/dH^2$ has extremum. The + and - signs show the high and low field sides with respect to H_c that is $H > H_c$ and $H < H_c$. For symmetric line shape these ratioes are equal to unity but our experiments show that these are different than unity. It is also shown that this asymmetry is strongly θ dependent, where θ is the angle the crystal C-axix makes with the static field, and is also enhanced by the impurity. These experiments were performed at two different temperatures $T=296^\circ$ K and $T=113^\circ$ K. It is seen that at low temperature the line is more symmetric.

INTRODUCTION

It is well known that most resonance profiles of Electron Spin Resonance (ESR) observed in the Laboratory are non-simple. That is, they do not fall clearly on a purely Gaussian or a purely Lorentzian shape. Of course either of these lineshapes are comple-