

$$D = Cd / \epsilon_0 A$$

Where C is the capacitance, d is the thickness, A is the area and ϵ_0 is the absolute permittivity of free space (8.854×10^{-12} F/m).

The variation of dielectric constant (D) was studied as a function of frequency for the grown crystal and is shown in Figure 6.a The high value of dielectric constant at low frequencies may be due to the presence of all the four polarizations and its low value at higher frequencies may be due to the loss of significance of these polarizations gradually. From the figure 6.a, it is also observed that dielectric constant decreases with increase in frequency. The variation of dielectric loss with frequency is shown in Figure 6.b. The characteristics of low dielectric loss at very high frequency suggest that it possesses enhanced optical quality with lesser defects and this parameter is essential for nonlinear optical applications

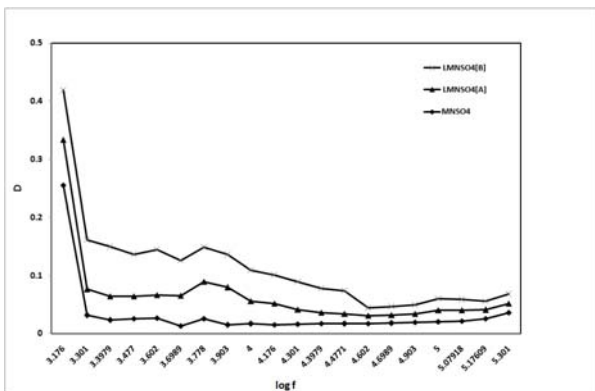


Figure 6 (a): Dielectric constant Vs log f

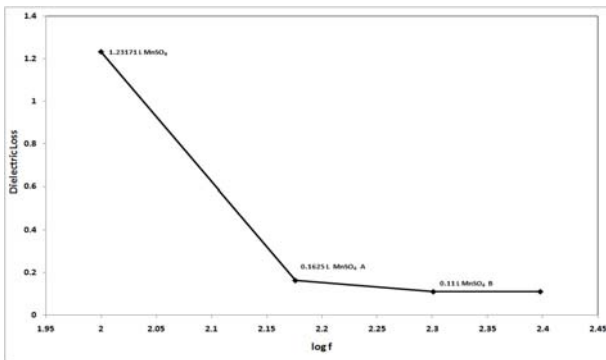


Figure 6 (b): Dielectric loss (tanδ Vs log f)

4. Conclusion

The inorganic material L-Lysine Doped MnSO₄ was synthesized and its structure was confirmed by powder X-ray diffraction study. The size of the crystal depends on combinations of MnSO₄ and L-Lysine. The [021], [011] and [120], facets are the most prominent among the other facets of the grown crystal. The functional groups present in the grown crystals were confirmed by FTIR spectroscopy in comparison with that of standard wavelength in the range of 190-1100nm. UV-vis study showed that the grown crystals have good optical transparency between 300-1100nm. The Vickers hardness number of the grown crystal increase with load at lower load conditions and then saturates. The calculated value of Meyer's index 'n' of the crystals is greater than 1.6 and reveals that they are soft. The dielectric

measurements reveal that L-Lysine doped MnSO₄ crystal possesses enhanced optical quality with lesser defects.

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