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AC conductivity and Dielectric Study of Chalcogenide Glasses of Se-Te-Ge System

of

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Abstract: The ac conductivity and dielectric properties of glassy system $\text{Se}_x\text{Te}_{79-x}\text{Ge}_{21}$, with $x = 11, 14, 17$ at.%, has been studied at temperatures 300 to 450 K and over a wide range of frequencies (50 Hz to 500 kHz). Experimental results indicate that the ac conductivity and the dielectric constants depend on temperature, frequency and Se content. The conductivity as a function of frequency exhibited two components: dc conductivity σ_{dc} , and ac conductivity σ_{ac} , where $\sigma_{ac} \sim \omega^s$. The mechanism of ac conductivity can be reasonably interpreted in terms of the correlated barrier hopping model (CBH). The activation energies are estimated and discussed. The dependence of ac conductivity and dielectric constants on the Se content x can be interpreted as the effect of Se fraction on the positional disorder. The impedance plot at each temperature appeared as a semicircle passes through the origin. Each semicircle is represented by an equivalent circuit of parallel resistance R_b and capacitance C_b .

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