Electrical properties of an ethanol-dodecane mixture near the upper critical solution point.

Autorzy

Kazimierz Orzechowski

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Streszczenie

The electric permittivity and conductivity of an ethanol–dodecane critical mixture have been investigated as a function of frequency (100 Hz–1 MHz) and temperature. Dispersion of the electric permittivity and conductivity were found and these phenomena were interpreted in terms of Maxwell–Wagner polarization. The temperature dependence of $\hat{\imath}\mu$ for high frequencies was described according to Senger's model and the theoretically predicted critical exponent (0.89) agrees with the experimental results. The temperature dependence of the conductivity was analysed both for low ($f < f_r$; f_r is the characteristic frequency for Maxwell–Wagner polarization) and high ($f > f_r$) frequencies. The non-linear temperature dependence of the background term makes the estimation of the conductivity critical exponent very difficult, but for low frequencies the exponent □= 1 –α is the most probable one. The Maxwell–Wagner permittivity increment defined as $\Delta\hat{\imath}\mu_{MW}=\hat{\imath}\mu_{f < fr}-\hat{\imath}\mu_{f>fr}$ diverges in the vicinity ofT_c with an exponent of –0.39. The conductivity increment defined as $\Delta\sigma_{MW}=\sigma_{f>fr}-\sigma_{f<fr}$ diverges in the vicinity ofT_c with an exponent of 0.22, close to the value predicted on the basis of the Wagner model, β-exponent value.

Adres publiczny

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