

(Research Article 1)

Dielectric properties of PVDF thin films doped with 3 wt.% of RCl_3

(R = Gd or Er)

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The dielectric permittivity (ϵ'), electric modulus (M''), and ac conductivity (σ_{ac}) of pure polyvinylidene fluoride (PVDF) and PVDF containing 3 wt.% RCl_3 ($R = Er$ or Gd) were measured. The incorporation of 3 wt.% of $ErCl_3$ or $GdCl_3$ within the PVDF matrix is found significantly to increase its ϵ' and σ_{ac} . All investigated samples show different relaxation processes within the studied temperature and frequency ranges. The first process is α_a -relaxation, which occurs around the glass transition temperature, T_g . The second process is α_c -relaxation, which is associated with the molecular motions in the crystalline region of the main polymer chain. Third is the ρ -relaxation which observed for pure PVDF at low temperatures and high frequencies. The frequency dependence of σ_{ac} shows that the conduction mechanism for pure PVDF and PVDF containing 3 wt.% of RCl_3 is correlated barrier hopping (CBH). The binding energy of the carriers was calculated based on the CBH model. Finally, the results obtained in this work are discussed and compared with those for 3 wt.% $LaCl_3$ -doped PVDF and similar materials.