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DIELECTRIC POLYMERS BASED ON 2,2,2-TRIFLUOROETHYL ACRYLATE : STRUCTURE, THERMAL AND DIELECTRIC CHARACTERIZATIONS

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High dielectric constant polymers are becoming crucial components in advanced electronic devices, such as memory and gate dielectrics for integrated circuits, stationary power generation, and miniature capacitors for telecommunication1. Aiming to develop new dielectric polymers containing CN and F groups with strong dipole moments, acrylonityrile (AN) with 2,2,2-trifluoroethyl acrylate (ATRIF) as a fluorinated comonomer were reacted via radical copolymerization being reported in the present work. The homopolymer of ATRIF wasalso prepared. Both copolymer, poly(AN-co-ATRIF), and homopolymer, poly(ATRIF), were dielectrically characterized over a frequency range from 10-1 to 106 Hz , and in a temperature range from 223 to 393 K. A dominant relaxation process was visible being associated with the dynamic glass transition, ?-relaxation. As expected, the maximum of each peak is shifted to higher frequencies as the temperature increases due to an enhancement of dipolar mobility in the origin of cooperative motions above Tg. At high temperatures, and low frequencies, the dielectric spectra was dominated by charge transport A significant shifts of the dielectric loss curves for lower frequencies/ higher temperatures of poly(AN-co-ATRIF) copolymer relative to the homopolymer was observed, revealing an hindered mobility originated by the inclusion of acrylonitrile groups in the copolymer. A VTF temperature dependence of the relaxation times (?) was found, as characteristic of cooperative processes. The extrapolation of the VFT equation to ?=100s allowed to estimate a glass transition temperature (Tg) for each material, which differ ~40K, the one of the copolymer being higher (308K) in accordance with the shifts in isotherms. The relationship structure- dielectric properties