

Abstract : In this paper, the influence of porosity on the stability of charge and piezoelectric d_{33} coefficient for porous PTFE electrets is studied by using measurements of isothermal surface potential decay, quasi-static direct piezoelectric coefficient, elastic (compression) modulus and a leakage current through porous and non-porous PTFE samples during corona charging, analyses of open-circuit thermally stimulated discharge current spectra, X-ray diffraction spectra and differential scanning calorimetry. The results point out that with the increase of porosity, the stability of charge deposited in the film and the piezoelectricity of the film are improved in a certain range of porosity. The reasons for the influence of porosity on the thermal stability of the charge storage and piezoelectricity are also investigated. Our results also demonstrate that the improvement of the thermal stability of the piezoelectric coefficient at increasing porosity is due to improved thermal charge stability and the improved stability of the mechanical properties of the material. At the same time, the limitation of the improvement of charge storage and piezoelectricity of a PTFE film with very high porosity is discussed.