Abstract： Laminated polytetrafluoroethylene (PTFE) films, which are made of compact and porous PTFE layers, are prepared through the process of sintering. The corona charging technique is utilized to make the laminated PTFE films piezoelectric, thus transforming them into piezoelectrets. The crystallinity, Young's modulus in compression mode, stress-strain behavior, charge dynamics, and thermal stability of the fabricated films are investigated by particular techniques, such as differential scanning calorimetry (DSC), dielectric resonance spectra, dynamic mechanical analysis (DMA), thermally stimulated discharge (TSD) spectra, and isothermal annealing, respectively. The results reveal that the crystallinity of the fabricated PTFE films with three and five-layer systems are 79.5 and 59.8%, respectively. The compressive and tensile moduli at room temperature are 7.4 and 167 MPa for the three-layer system samples. The resulting temperature peak increases by 20°C as the heating rate increases from 2 to 4°C in TSD measurement. Two charge drift mechanisms exist in the films when the samples are thermally stimulated and discharged. With the increase of corona charging voltage from -10 to -25 kV, more and more detrapped charges from the deeper traps in the laminated PTFE films are released, corresponding to the current peaks identified in the temperature range from 130 to 140°C, which prefer to drift through the solid PTFE layers. However, charges also escaped from the relevant shallow traps, corresponding to the current peaks identified in the temperature that range from 80 to 95°C. The charge drift along the surface of the PTFE fibers is always a dominant mechanism, showing resistance of the corona charging voltage under the experimental-study conditions. The sample shows a stable piezoelectric d_{33} coefficient of 50 pC/N at 120°C after one day annealing at the same temperature.