Abstract： Laminated fluoropolymer films with a regular microstructure were made from compact fluoroethylenepropylene (FEP) and porous polytetrafluoroethylene (PTFE) using a process consisting of patterning and fusion bonding steps. The fabricated films were rendered piezoelectric via the contact charging or corona charging methods. The piezoelectric responses of such piezoelectret films were measured in the frequency range 100 Hz-100 kHz. The results show that the acoustic impedance of the FEP/PTFE films is around 0.014-0.030 MRayl. Dynamic piezoelectric d_{33} coefficients of up to 500 pCN^{-1} were achieved at 100 Hz for these films. Microphones built with such films exhibit flat response curves in a broad frequency range if the diffraction effects are eliminated. Bonded films with all positive charges deposited in the porous PTFE layers show the best thermal stability: after annealing for 1100 min at 125℃, the remaining d_{33} at 1020 Hz is about 30% of the initial value, corresponding to 105 pCN^{-1}, and it remains relatively stable at this temperature. This remarkable thermal stability has to be attributed to the fact that positive charges are more permanent in porous PTFE than in FEP. The entire charge distribution exhibits much better thermal stability than is achievable for customary polypropylene piezoelectrets.