Abstract： Commercially available cross-linked polypropylene (XPP) foam sheets exhibit strong piezoelectric effect after proper mechanical modification and polarization. Such electromechanical property in XPP is due to the specific space charge distribution and void structure, and this kind of electro-active materials is named piezoelectrets or ferroelectrets. Owing to the unique features such as low cost, small acoustic impedance, flexibility, weight light, piezoelectret films could be applied in air-borne acoustic and ultrasonic transducers, wearable flexible electronic devices, micro-energy harvesters, and so on. In this paper, the mechanical and piezoelectric performance of XPP films, with a gel fraction of 50% and treated by extending, is investigated. The results show that the Young′s module of XPP in the thickness direction decreases from 4.9 MPa to 0.54 MPa by the increasing extending ratios from 0% to 100%. The quasi–static piezoelectric d_{33} and d_{32} coefficients are 420 and 0.4 pC/N for the samples with an extending ratio of 100%, respectively. Piezoelectric d_{31} coefficients of about 2.4 pC/N are obtained in the films with a treatment of an extending ratio of 20%. This value is larger than the films without treatment, which could be due to the reduction of Young′s modulus in longitudinal direction. After an annealing at 70 °C for 24 h, the d_{33} coefficients in XPP films decrease to 43% of the initial values, showing an improved thermal stability comparing with normal polypropylene piezoelectret films. The enhancement of thermal stability in XPP films could be associated with the cross-linked molecular network.