

**Abstract :** Fluoroethylenepropylene (FEP) piezoelectret films with a cross-tunnel structure were prepared using a template-based process and contact charging. Energy harvesting from the fabricated FEP films was investigated in the {3-3} mode at various seismic masses, load resistances and exciting frequencies. The results show that the output power is dependent on the seismic mass, load resistance and vibration frequency. Around the optimum load resistance, a normalized output power of 73  $\mu\text{W}$  at 130 Hz was obtained for an FEP piezoelectret film with a seismic mass of 60 g and an area of 7.1  $\text{cm}^2$ . At a vibration frequency of 150 Hz, the output power from an FEP film sample with an excited area of 3.1  $\text{cm}^2$  and a seismic mass of 54 g, is high enough to light a blue color LED diode, showing such thin, light and flexible FEP piezoelectret films may be applied in environmental vibration energy harvesters for powering low-power electronic devices.