

Pyroelectric Effect in Ultrathin Layers of Achiral Mesogenic Composites

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The pyroelectric properties of the solid mixtures of achiral liquid crystalline polymers with their monomers were studied. The composites were fabricated in a thin film form (less than 1 μm) by spin-coating technique. The maximum value of the current responsivity being $0.67\mu\text{A/W}$ has been obtained for optimum monomer/polymer ratio of 33:67% by weight. The pyroelectric voltage was measured in the frequency range from 10Hz up to 250kHz. The figure of merit (FOM) for the composite at room temperature is about $0.8\text{nC/cm}^2\text{K}$ which is more than twice higher than that of polyvinylidene fluoride with trifluoroethylene P(VDF-TrFE) 70:30%. The Fig.1 shows the frequency dependence of the pyroelectric current for the two liquid crystalline mixtures M6R8+PM6R8 and M6R14n+PM6R14n. Here we also show current data for two standards: guanidine nitrate and random copolymer P(VDF)-TrFE. The data obtained confirm the prospects of these class liquid crystal materials for pyroelectric applications. Our results are very promising as the temperature interval, electric current responsivity and FOM of the discussed ultrathin films are comparable and may be better even than those of the commercial pyroelectric sensors.

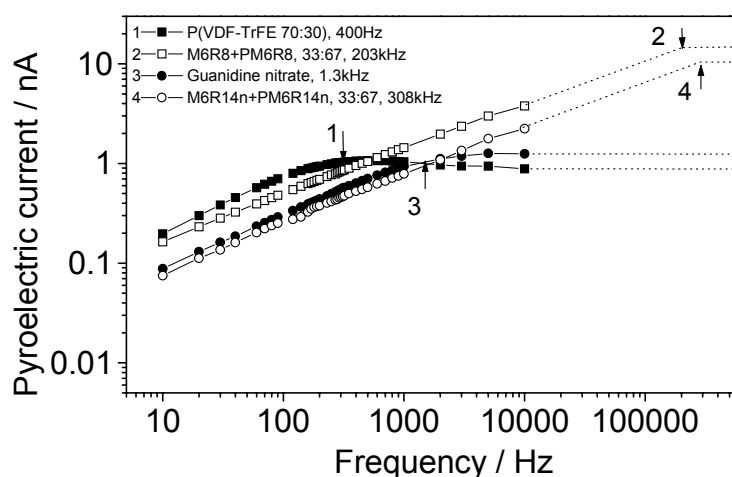


Fig.1