

Piezoelectric PVDF Film

δ^+ PolyK δ^-

PolyK Piezo PVDF film

- In-house roll-to-roll production of piezoelectric PVDF film with thickness from 10 μm to $>200 \mu\text{m}$: consistent quality and low cost.
- Beta Phase PVDF film (non poled) with high optical transparency: you can design your own poling pattern for special applications.
- Poled PVDF film with high d_{33} and d_{31} with our proprietary film production and poling process using the best resin.
- Produce special thickness film based on application with short lead time
- Supply paper-size film for R&D to $>100 \text{ m}$ long film for OEM, quick deliver
- Special electrodes can be applied based on required: sputtered gold, silver paste, etc.

Customization

Transparency

High Performance



Patterned Electrode with Low-Cost R2R Process

Transparent Speaker

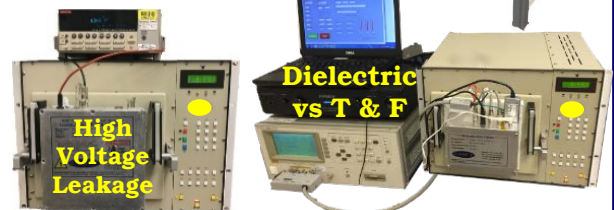


Dielectric/Piezoelectric Properties	PolyK PiezoPVDF	Unit
Piezo Strain Constant	25~35	d_{31} (10^{-12} C/N)
	-28~-38	d_{33} (10^{-12} C/N)
Piezo Stress Constant	210~220	g_{31} (10^{-3}Vm/N)
	-330~-350	g_{33} (10^{-3}Vm/N)
Dielectric Constant	10~14	ϵ_r
Pyroelectric Coefficient	26~30	ρ ($10^{-6} \text{ C/m}^2\text{K}$)
Electromechanical Coupling Factor	10~13	k_{31} (%)
	12~15	k_t (%)
Maximum Voltage	>100	E ($\text{V}/\mu\text{m}$)
Mechanical Properties	PolyK PiezoPVDF	Unit
Tensile strength	0.4~0.6	σ_{MD} (10^9N/m^2)
	0.05~0.06	σ_{TD} (10^9N/m^2)
Young's Modulus	3~3.2	Y_{MD} (10^9N/m^2)
	2.8~3	Y_{TD} (10^9N/m^2)
Elongation at Break	20~30	ϵ_{MD} (%)
	5~7	ϵ_{TD} (%)

Dielectric, High Voltage, and Piezoelectric R&D

- Polymers: fluoropolymers of VDF with over 20 compositions & molecular weight
- PVDF-TrFE (80/20, 75/25, 70/30, 65/35, 55/45, 50/50), PVDF-TrFE-CFE (K=50 at 25 C), PVDF-TrFE-CTFE resin and film (from paper size to roll $>100 \text{ m}$)
- Films: solvent cast, extrusion, poled, 1-100 μm
- High-temperature polymers and film, PEEK, PI, PC, PEI, etc
- Low-Cost Test Equipment: polarization loop, dielectric constant vs temperature & frequency, leakage current
- Device: piezoelectric sensors, capacitors, actuators, etc

Ferroelectric Polarization Loop & Dielectric Breakdown



Piezoelectric, Ferroelectric, Pyroelectric & Electroactive Polymer Kit: P(VDF-TrFE)

For R&D in high energy density capacitor, piezoelectric, pyroelectric, electrocaloric ECE, & electroactive polymer EAP. Include **20 grams** of each of **Seven** typical polymer resins based on P(VDF-TrFE).

1. P(VDF-TrFE) 80/20 (mol), Curie: $\sim 135^\circ\text{C}$
2. P(VDF-TrFE) 75/25 (mol), Curie: $\sim 112-121^\circ\text{C}$
3. P(VDF-TrFE) 70/30 (mol), Curie: $\sim 104^\circ\text{C}$
4. P(VDF-TrFE) 65/35 (mol), Curie: $\sim 72^\circ\text{C}$
5. P(VDF-TrFE) 55/45 (mol), Curie: $\sim 66^\circ\text{C}$
6. P(VDF-TrFE) 50/50 (mol), Curie: $\sim 60^\circ\text{C}$
7. P(VDF-TrFE-CFE) Terpolymer 63/30/7 (mol), T_m : 130°C . Ferrorelaxor polymer with high dielectric constant ~ 60 at 25°C .
8. P(VDF-TrFE-CTFE) Terpolymer 65/31/4 (mol), T_m : 130°C . Ferrorelaxor polymer with high $K \sim 60$ at 50°C and 1 kHz .

Poly(vinylidene fluoride-co-trifluoroethylene) copolymers & terpolymers (CFE, CTFE)

US Supplier



Produced by Suspension Polymerization with Minimal Side Chain Defects and high Crystallization Temperature & Degree

Other compositions available upon request

P(VDF-TrFE) Composition Effect (from Q.M. Zhang, 2001)

