Polymer Piezoelectric Film Actuation for Microfluidic Systems

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Piezoelectricity is a property of the material to produce an electric charge when mechanically strained.

**Direct Effect:**
- Sensing

Piezoelectric materials also exhibit mechanical strain when an electric charge is applied.

**Reverse Effect:**
- Actuation
  - This effect is heightened by poling the material to align the internal electric dipole.

**Poling:**

Common piezoelectric materials:
- Piezoceramics (PZT)
- Natural and Synthetic Crystals
- Polymers
- Bones and Tendons

**Polyvinylidene Fluoride (PVdF)**

- Cheap, flexible and biocompatible polymer
- Can be cast into pellets and thin films
- Can be poled to exhibit piezoelectric properties

**References**
- Piezo film Sensors - MSI Technical Manual

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**Results**
- PVdF responds instantaneously to dynamic loading, but will not give proper, permanent output for static loads
- PVdF response is very similar and in phase with that of the strain gauges