Piezoelectric materials convert applied mechanical stresses into electrical signals or applied electrical fields into dimension changes. At Fraunhofer IAP we develop complete sensor- and actuator systems based on piezoelectric polymers such as polyvinylidene fluoride (PVDF) and its copolymers with trifluoroethylene (P(VDF-TrFE)) or hexafluoropropylene (P(VDF-HFP)). Our research is focused on the material optimization, the processing of layers, films and sheets, the deposition of electrodes, the functionalization of the processed layers in order to render them piezoelectric and the characterization of their properties such as ferroelectric hysteresis, piezoelectric coefficients, resonance frequencies and coupling factors. We also study the integration of piezoelectric transducer into light-weight structures and ultrasonic measuring heads.

According to customer requirements we offer to develop piezoelectric sensors and actuators as follows:

- material selection and adaptation (e.g. PVDF, P(VDF-TrFE), P(VDF-HFP) with variations of the VDF-content and different molecular masses), other material developments on request
- processing of layers, films and sheets with thicknesses between 500 nm and 400 µm, on substrates or freestanding
- layer, film or sheet processing by means of spin-coating, inkjet-printing, solvent-casting, doctor-blading as well as melt-pressing
- processing of electrodes via metallization (aluminum, gold, silver, chromium, single- and multi-layers), inkjet-printing (silver, PEDOT:PSS), air-brush (electrodes based on conductive nanoparticles).