Technological development in 21st century is related, amongst others, to progress in electronics and related fields. Since the charge carrier transport in the electronic circuits occurs in the volume of real materials, advances in electronics are closely related to new findings in the field of materials science. The 20th century was revolutionized by inorganic, crystalline (semi)conductors such as Silicon or Germanium. These materials enabled controlled charge carrier transport in, for instance, field-effect transistors, building up computer processors or energy conversion, as it happens in light-emitting diodes or solar cells. Perhaps soon we will face another materials revolution as a result of which part of the inorganic semiconductor-based electronics will be replaced by soft organic materials capable of printing on elastic substrates such as fabrics, foils etc. Such a change may trigger new generation of 'tailored' and wearable devices. The continuous development of electronic, useful devices causes also an increased demand on materials for sensors and autonomous power sources. In many applications solar cells seem to be the right idea. There is however a very interesting alternative, namely piezoelectric materials, or, in short, piezoelectrics. Piezoelectrics belong to the group of electroactive materials, which, when mechanically stimulated, can generate harvestable electric charges. In other words piezoelectric materials can convert mechanical stress into electric charge (or vice versa – this is known as an inverse piezoelectric effect). This is why, when used in the devices, piezoelectrics can be considered candidate materials for either energy converters (power sources) or sensors of mechanical stimuli such as compression, vibrations etc. The inverse piezoelectric effect can be used in actuators. Similarly like in the case of semiconductors, historically first piezoelectric materials were inorganic brittle crystals. In 1969 new perspectives were opened when piezoelectric effect was discovered in poly(vinylidene fluoride) (PVDF) – a partly crystalline polymer that similar to polyethylene but containing two highly electronegative fluorine atoms coupled with every second carbon atom in the polymer backbone. Presence of such electronegative atoms impart PVDF monomer units a strong dipole moment, which is even higher than that of water molecules! This dipole moment can be permanently oriented in certain kind of crystals formed upon controlled crystallization of the polymer. Because of the structure including a biased charge distribution in the basic crystalline unit cell, these particular crystals are referred to as polar crystals. "Trapping" of the dipole moment and further unipolar orientation of the crystals are necessary to make the material macroscopically piezoelectric. Polymers are actually good candidates in this respect: their elongated macromolecules get easily oriented as a result of flow when the polymer is molten or dissolved. Orientation of polymers in the solid state may also occur under influence a directional mechanical load, like for instance, during the tensile tests. Oriented (and hence 'stretched') polymer macromolecules form crystals easier, and, what is actually unique for PVDF, when crystallization occurs in certain temperature range, the polymer can form polar, oriented piezoelectric crystals. These findings are used nowadays to process PVDF and also other fluorinated polymers into the form of films and fibers which are used in vibration and pressure sensors, hydrophones etc. Some applications are even pretty strange like that in which the piezoelectric polymer is used in… shoe soles harvesting the energy of walking. The major drawback of the contemporary polymer-based piezoelectrics is that their shapes are limited to simple forms of films (either free-standing or on substrates) or fibers. This now is the main obstacle for their further development. In our project, therefore, we propose to solve this problem. Instead of stretching or in any other way treating the polymers mechanically, we developed the system in which we hit the polymer solution with the laser beam. The laser heats the system (i.e. both the substrate and the polymer solution on it), causes a local solvent evaporation and triggers formation of a crystal growth zone. Because growing crystals require incorporation of new macromolecules, we observe a directional flow of macromolecules in the solution, which causes orientation of the polymer chains. Moving the laser causes also shifting the crystal zone in a certain direction and in this way a crystalline film is formed. In order to enhance both degree of orientation and formation of the polar crystals the crystallization will be additionally supported by addition of flat particles of aluminosilicates such as mica or fluoromica. The particles orient in plane of the film and form in this way narrow channels (galleries) that enforce diffusion of macromolecules only in the direction parallel to the film surface. The addition of aluminosilicate in the films is the reason why we call them 'composite'. A good dispersibility of the aluminosilicate particles will be ensured by chemical modification of their surface. In order to have dipole moments of all crystals oriented unidirectionally, and make the composite films functional, they will be poled using the external electric field during crystallization. The films will not only be deposited on the flat substrates but also on the curved surfaces of optical lenses, or surfaces substrates micropatterned with focused ion beam. With the help of microscopy, spectroscopy, X-ray diffraction, and also a number of other experimental techniques we plan to thoroughly analyze the structure of films with various compositions, deposited using different parameters on variety of substrates with different topography. Understanding the correlations between crystallization conditions in our experiments and structure and properties of the films has a great potential to open completely new perspectives in polymer engineering. In particular, in case the scientific hypotheses come true it will be possible, for instance, to design and fabricate sensoric polymer 'skin' for robots or soft piezoelectric generators in energy-harvesting clothing.