Several applications require high-quality piezoelectric films in a thickness range between 5 μm and 50 μm, for example for powerful actuators or resonant operation at a defined frequency. This is challenging both for thin-film (PVD, CVD) and for thick-film technologies (sintering), especially, if elevated temperatures cannot be tolerated by the substrate. PZT films with thicknesses above 25 μm have been deposited at a substrate temperature of 600 °C by means of Gas Flow Sputtering (GFS). This method, based on an intense hollow cathode glow discharge, allows for stable reactive sputter processes from metallic targets, a fine-tuning of mechanical film stresses, a good control over composition, microstructure, and crystallographic properties. A piezoelectric coefficient d33 of 500 pm/V has been reached and ultrasonic PZT arrays have been prepared on pre-structured Si substrates. Like other PVD methods, GFS results in a smooth, columnar and strain-tolerant microstructure with excellent adhesion. As a gas-flow-driven method, on the other side, GFS allows for local or internal coatings, comparable to spray coatings. Besides PZT, also aluminum nitride is under investigation.