From ‘Biospecies’ to Piezoelectric and Pyroelectric Sensors of Today’s Technology

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Biological species have provided various sensor design avenues to today’s technological and sensor designers. Many concepts of today’s piezoelectric and pyroelectric sensors and their biomedical applications have our original thinking inspired by the way bats and snakes, e.g., respectively sense their ambient environment situations. As engineers and materials scientists we have put those perspectives in advanced tensor property understanding that deals with the complex interaction in polarizable, deformable, and nonlinear materials and thus leads to the design of the most advanced biomimetic or bioinspired sensors. This talk will introduce the fundamental designing principles of multivariable sensing mechanisms, give some interesting biosensing examples around us, and discuss the perspectives that are inspiring the nanotechnologists to design new sensors based on the pyroelectric and piezoelectric mechanisms at surface, interface, and on nanoscales. A brief discussion on the alternative use of these sensors as actuators and as a source of energy harvesting will also be presented.