

Flexible active-matrix cells with selectively poled bifunctional polymerceramic nanocomposite for pressure and temperature sensing skin

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A monolithically integrated bifunctional frontplane is introduced to large area electronics. The bifunctional frontplane element is based on a composite foil of piezoelectric ceramic lead titanate nanoparticles embedded in a ferroelectric poly(vinylidene fluoride trifluoroethylene) polymer matrix. Bifunctionality to pressure and temperature changes is achieved by a sequential, area selective two-step poling process, where the polarization directions in the nanoparticles and the ferroelectric polymer are adjusted independently. Thereby, sensor elements that are only piezoelectric or only pyroelectric are achieved. The frontplane foil is overlaid on a thin-film transistor backplane. Our work constitutes a step toward multifunctional frontplanes for large area electronic surfaces. © 2009 American Institute of Physics. [DOI: [10.1063/1.3191677](https://doi.org/10.1063/1.3191677)]