

3.9 Fabrication and Pyroelectric Response of Different Types of Pyroelectric Detectors Based on Epitaxial $K_{(1-y)}Na_yTa_{(1-x)}Nb_xO_3$ Thin Films

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We fabricated and characterized three types of pyroelectric detectors based on $K_{1-y}Na_yTa_{1-x}Nb_xO_3$ (KNTN) thin films grown by liquid phase epitaxy (LPE). Two of them consisted of a hybrid structure on silicon, where for comparison in one case the film was thermally isolated, whereas it had thermal contact to the underlying wafer in the second case. The thermal isolation of the detecting elements was achieved by the anisotropic etching of the silicon.

By thermal isolation the thermal time constant could be raised from a value of 0.9 ms in the non-isolated type to 2.9 ms in the isolated structure. The thermally isolated detectors showed a two times higher pyroelectric response at and below frequencies of 100 Hz.

In addition, Ba-doped KT was used as a substrate for the growth of KNTN. Because of its lower resistivity than pure KT (see above), a third type of pyroelectric detectors could be fabricated where the Ba:KT substrate was used as bottom electrode. This detector showed its maximal voltage responsivity at 3 Hz.