

強誘電体セラミックス, PVDF, PMN-PT 結晶の電気熱量効果

Electrocaloric Properties of PZT-based Ceramics, PVDF, and PMN-PT Crystals

湘南工大工¹ ○眞岩 宏司¹

Shonan Inst. Tech.¹ ○Hiroshi Maiwa¹

E-mail: maiwa@mate.shonan-it.ac.jp

The electrocaloric effect (ECE) is a phenomenon in which a material shows a reversible temperature change under an applied electric field. In order to create ECE cooling devices, materials with large ECEs are required. In this study, the sample temperature changes including the electrocaloric effect under bipolar electric field were measured. PZT-based ceramics with various T_c s, PVDF films, $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$ (PMN-PT) crystals were used as samples. The bipolar triangular waves with 0.1 Hz in frequency were applied to the samples, the sample temperatures were measured by using thermocouples. The field-temperature loops were obtained by averaging 5 cycles. The loops of the PVDF films under bipolar field of 2500 kV/cm and PZT ceramics under bipolar field of 50 kV/cm were shown in Fig. 1. The loops have similar shapes of butterfly loops.

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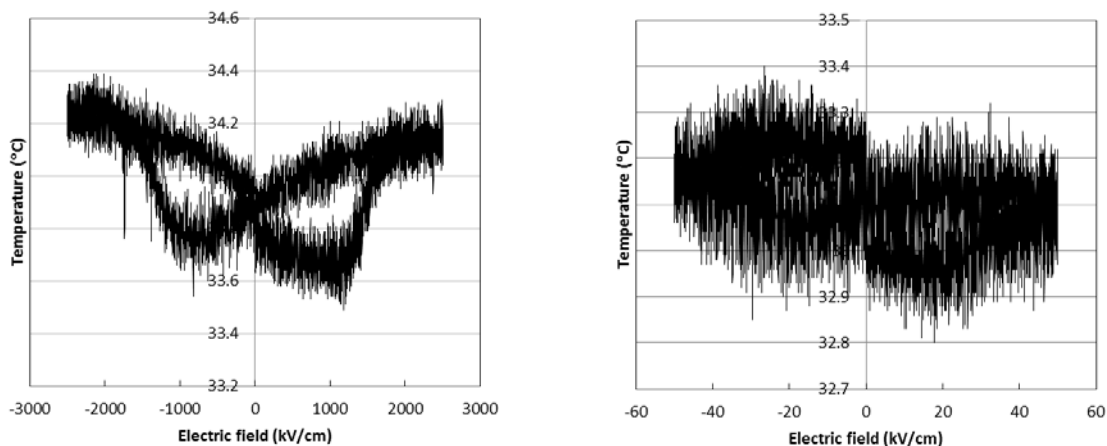


Fig. Bipolar field-induced temperature changes of the PVDF and PZT ceramics.