Electric Field Effects in $Pb(Zn_{1/3}Nb_{2/3})O_3$-7%$PbTiO_3$ Solid Solutions

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Solid solution systems such as (1-*x*)$Pb(Zn_{1/3}Nb_{2/3})O_3$-*x*$PbTiO_3$ (PZN-*x*PT) are known as relaxor ferroelectrics. Among them, PZN-*x*PT having the morphotropic phase boundary (MPB) is a technologically important material mainly due to the giant dielectric and piezoelectric responses. A theoretical model for such physical properties near MPB was proposed on the basis of the Landau-type free energy function.[1)] It was also reported that temperatute(T)-field(E) phase diagrams including the critical end point(CEP) can be qualitatively reproduced using the Landau-type free energy function.[2)]

In our previous work, we investigted T-E phase diagrams in PZN-9%PT near MPB, and found that the diffuseness of the phase transition in (1-*x*)PZN-*x*PT considerably decreases when the dc biasing field is applied, implying that decrease of heterogeneity owing to the applied electric field may make the phase transition sharp.[3)]

To clarify the bulk property related to an avarage structure, we investigated the phase transition by using such an electric field effect. Fig. 1 shows the T-E phase diagram with the electric field along the $[111]_c$-direction in PZN-7%PT, where the measurment is carried out on heating or on changing the dc field after field cooling in PZN-7%PT. The stable region of the orthorhombic phase under the electric field was clarified.

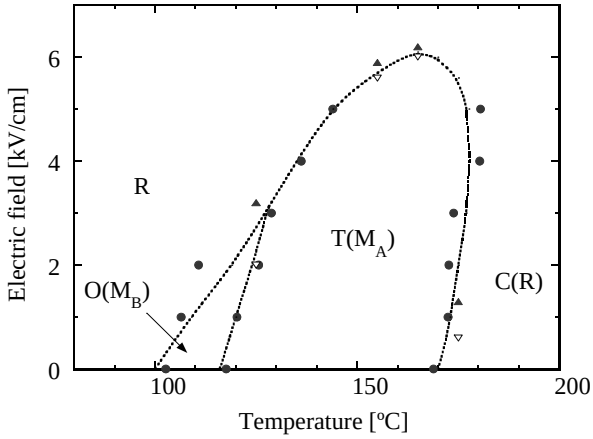

Fig. 1. Temperature-field phase diagram under the dc biasing field along the $[111]_c$-direction in PZN-7%PT.

References

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