

Highly ordered nanoporous $MTiO_3$ (M=Pb, Ba, Sr) array film from anodic titanate

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One-dimensional (1-D) ferroelectric nanomaterials on substrates are of great interest because of their peculiar physical properties of large surface area, excellent charge transport and outstanding ferroelectric properties. Especially, well-aligned ferroelectric nanowire arrays on a conducting substrate are suitable for three-dimensional device elements in miniaturized ferroelectric devices. They also provide opportunity to study the size and morphology dependence of optical, magnetic, and electronic properties.

In this study, we synthesized vertical aligned nanoporous $MTiO_3$ nanotube array on Ti substrate from anodic titanate. First, highly ordered nanoporous titanate is prepared by 2-step anodization of Ti foil. And then they transformed to perovskite materials keeping up the shape by hydrothermal treatment using anatase nanoporous titanate. The as-synthesized nanoporous $MTiO_3$ array film determines the structure by SEM, HRTEM and XRD. And ferroelectric properties of $PbTiO_3$ and $BaTiO_3$ also were investigated by PFM (piezoforce microscopy).