Pressure-induced Phase Transitions of Perovskite Ferroelectric Crystals: Comparison of Hydrostatic and One-dimensional Compression Pressure

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The effects of hydrostatic and one-dimensional compression pressure on phase transition of perovskite ferroelectric crystal were comparably investigated via the measurement of polarization P_r with respect to applied pressure and phase field simulation. The results showed that hydrostatic pressure can induce ferroelectric-to-paraelectric phase transition, while one-dimensional compression can stabilize ferroelectric phase. This phenomenon was very different from the phase transitions of metal crystals, such as iron. In the framework of LD phenomenological theory, this phenomenon is believed to be associated with the strong anisotropy and electromechanical coupling existing in ferroelectrics under high pressure.