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| Nota di contenuto | Introduction -- Optothermal field effect transistors based on the PMN-26PT single crystal -- Ultra-broadband photodetectors based on the PMN-28PT single crystal -- Self-powered ferroelectric memory systems -- Conclusion and Outlook. |
| Sommario/riassunto | This book explores the applications of ferroelectric materials in information technology by developing several prototype devices based on Pb(Mg _{1/3} Nb _{2/3})O ₃ -PbTiO ₃ (PMN-PT) single crystals. It describes how an optothermal field-effect transistor (FET) was constructed on the PMN-26PT single crystal, using a MoS ₂ monolayer as the channel semiconductor material. This fusion of pyroelectric effect and the interface engineering of 2D materials provides an effective strategy for the 'photon revolution' of FET. An ultra-broadband photodetector (UV ~ THz) was monolithically integrated into a [111]-oriented PMN-28PT |

single crystal by using silver nanowires in the transparent top electrode. The photodetector showed a dramatic improvement in operation frequency up to 3 kHz: an order of magnitude higher than that of traditional pyroelectric photodetectors. A self-powered integrated module was demonstrated through the combination of a triboelectric nanogenerator and a ferroelectric FET. The stored information can easily be written in the memory system using mechanical energy, solving the power consumption problem with regard to information writing in ferroelectric nonvolatile memories. This book extends the applications of ferroelectric single crystals into areas other than piezoelectric devices, paving the way for exciting future developments.
