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Improving Energy Storage Properties of $PbHfO_3$-Based Antiferroelectric Ceramics with Lower Phase Transition Fields

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Experimental section

The high-quality slurry was synthesized by mixing the second ball-milled PLHST matrix powders with solvent (toluene/ethanol), dispersant (phosphate ester), binder (polyvinyl butyral), plasticizer (polyethylene glycol-400/benzyl butyl phthalate) and homogenizer(cyclohexanone). After ball milling for 24h, the bubbles were removed from the slurry in a vacuum defoaming machine. The homogeneous slurry with good liquidity was cast on PET release film by using a tape casting machine. The wet films were kept for 12 h at room temperature for desiccation. The ceramic thick films were cut to square with a side length of 12 mm x 12 mm and the same thick films were pressed into square green bodies at 30 MPa and 70 °C by using a hot press mold. Finally, the samples were sintered to form ceramics. The thickness of testing sample is about 100 μm.

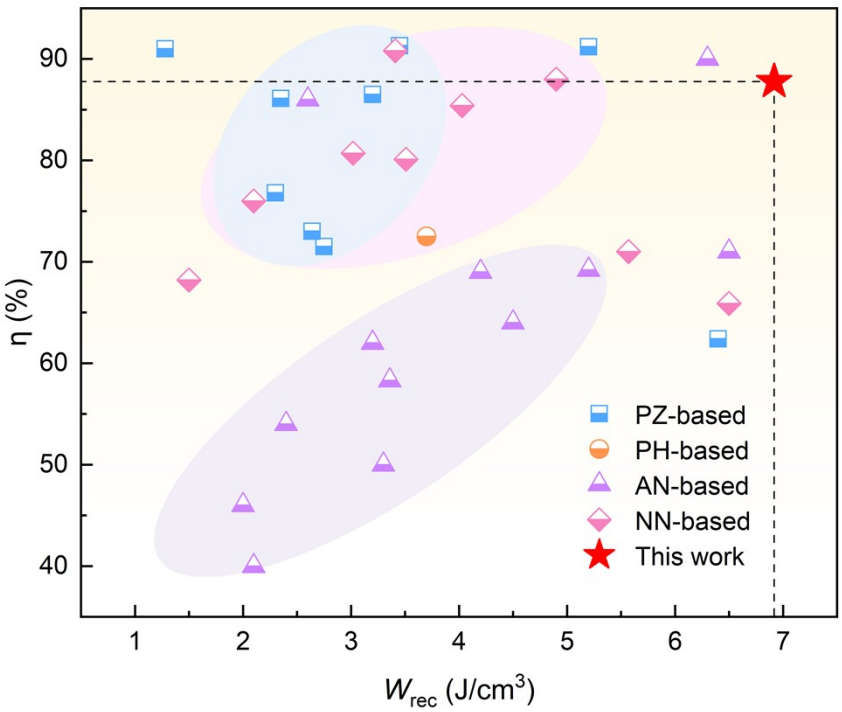

Fig. S1 A comparison of W_{rec} and η among this work and previously reported ceramics. PZ: $PbZrO_3$, PH: $PbHfO_3$, AN: $AgNbO_3$, NN: $NaNbO_3$.