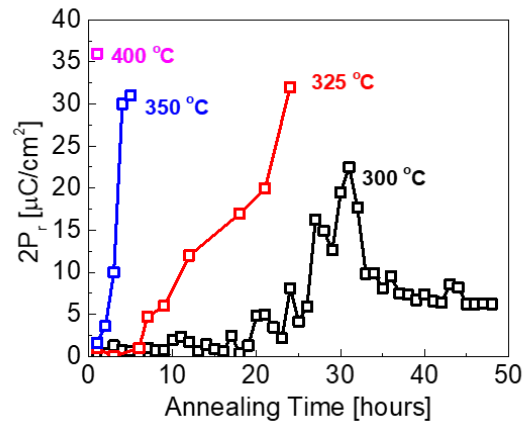
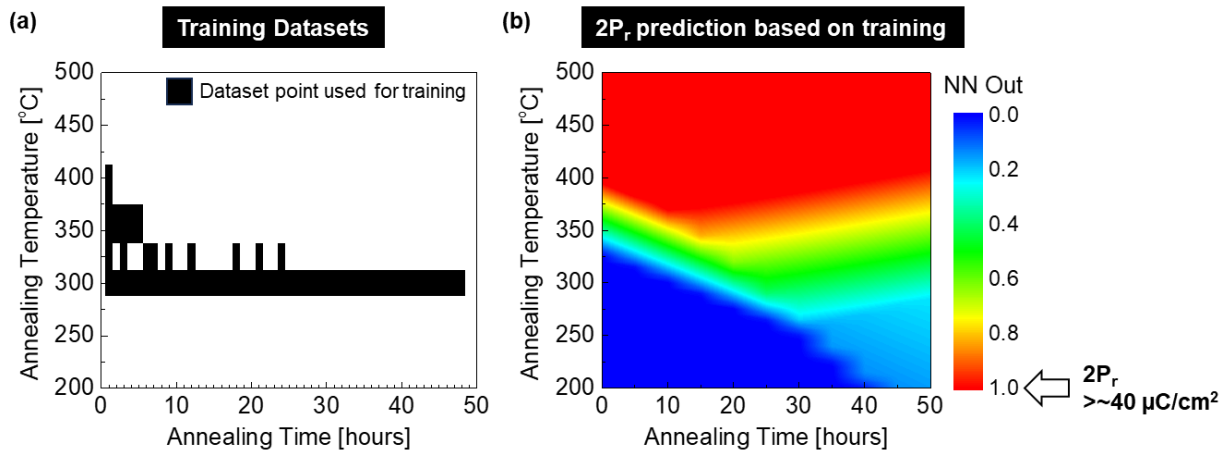


(Supplemental Document) Machine Learning-Driven Thermal Budget Analysis for Ferroelectric  $\text{Hf}_{0.5}\text{Zr}_{0.5}\text{O}_2$  Capacitors



**Fig. 1.** Remanent polarization ( $2P_r$ ) as a function of annealing conditions. Ferroelectric performance is achieved in HZO capacitors after furnace annealing at 300 °C for over 30 hours.



**Fig. 2.** (a) 2D distribution of dataset points used for training the deep-neural-network (DNN). (b) Predicted  $2P_r$  values based on the trained DNN model. Despite the limited number of training datasets, the model successfully predicts  $2P_r$  over an extended range of annealing conditions.