Supporting Information

Understanding fatigue and recovery mechanism in $Hf_{0.5}Zr_{0.5}O_2$ based thin films capacitors for high endurance ferroelectric memory and neuromorphic hardware

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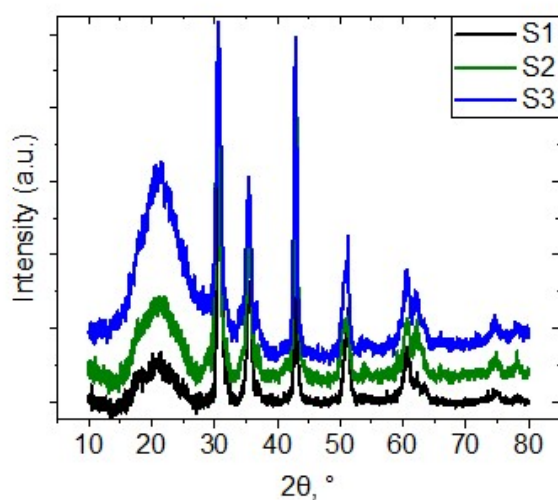
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Figure S1. Long range scan of 2θ from $10°$ to $80°$ by GIXRD for samples S1, S2 and S3.
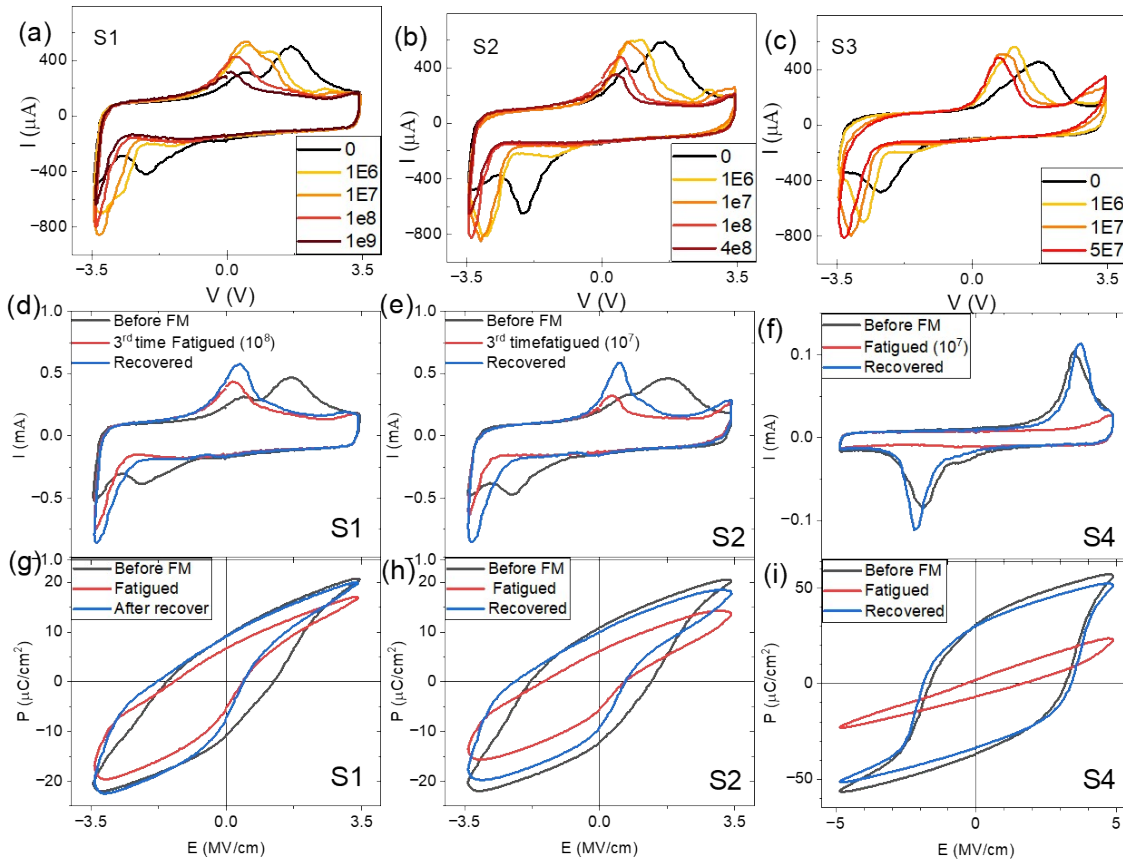
Figure S2. DHMs measured before fatigue pulsing cycle (black lines), after certain number of fatigue cycles (orange to red lines) of S1, S2 and S3. (**a,b,c**) I-V plots; Fatigued and after recovery DHMs (red and blue lines) of S1, S2 and S4 (**d,e,f**) I-V plots, (**g,h,i**) are P-E plots.
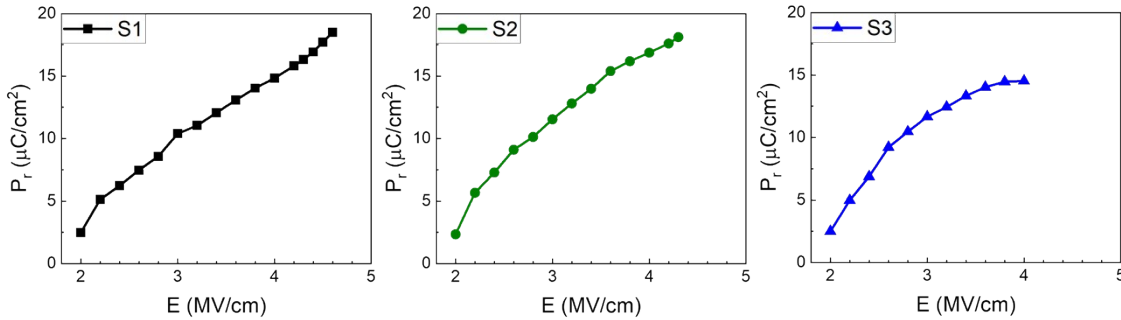

Figure S3. Extracted P_r values from PUND hysteresis plotted in accordance with applied electric field.
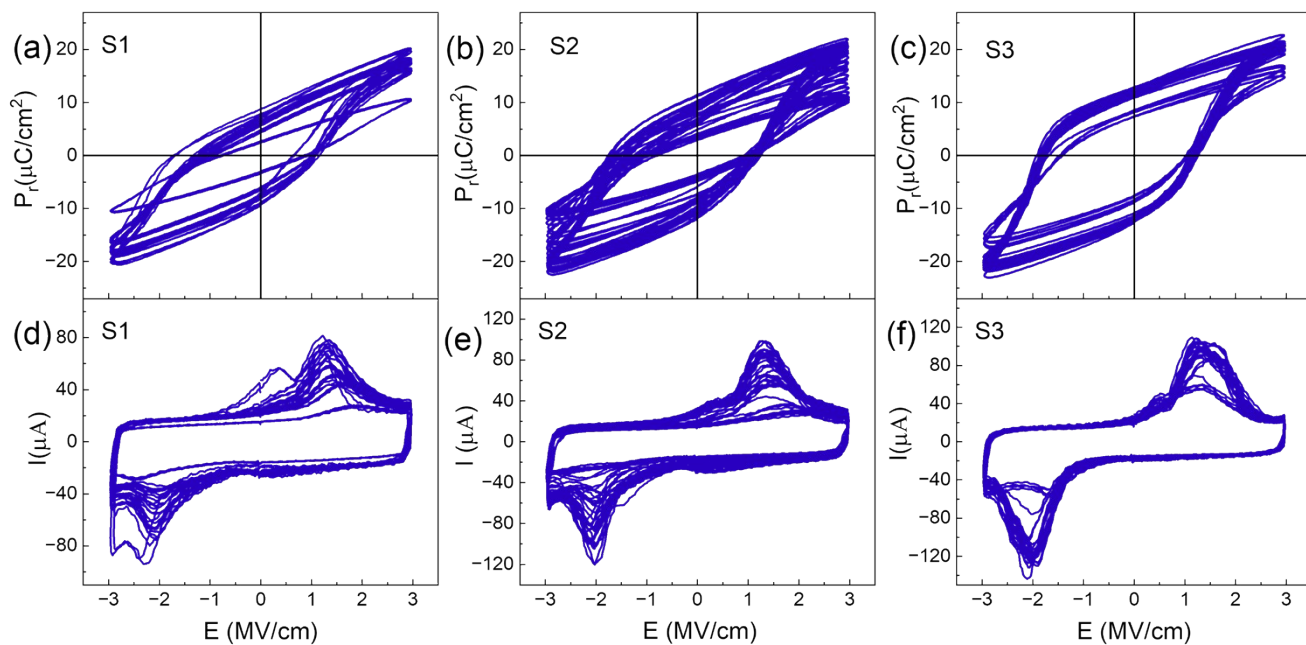
Figure S4. DHMs measured from devices at multiple different locations of the wafer from S1, S2 and S3 for a quick comparison.
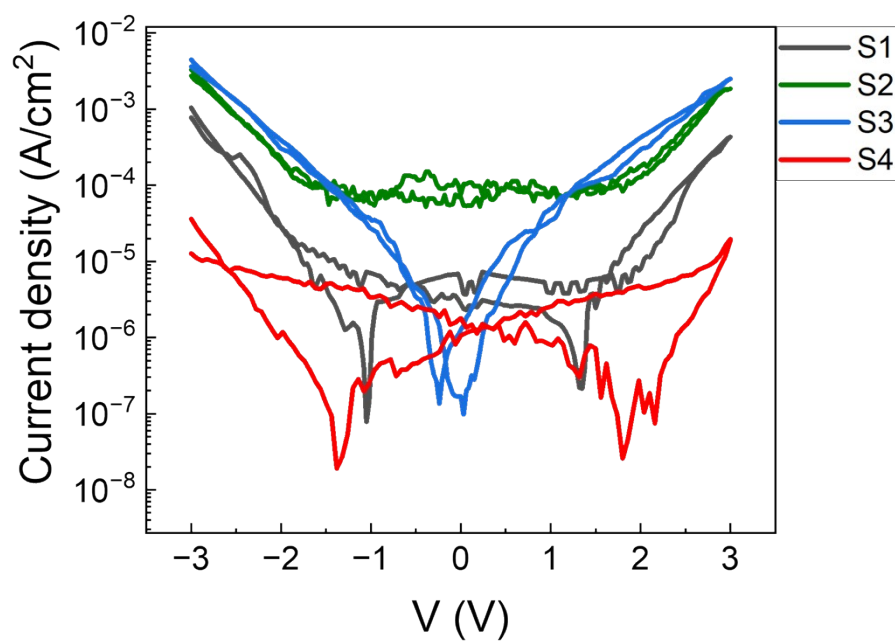

Figure S5. Static Current density -Voltage characteristics of samples S1, S2, S3 and S4.