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Self-polarized piezoelectric thin films: preparation, formation mechanism and applications

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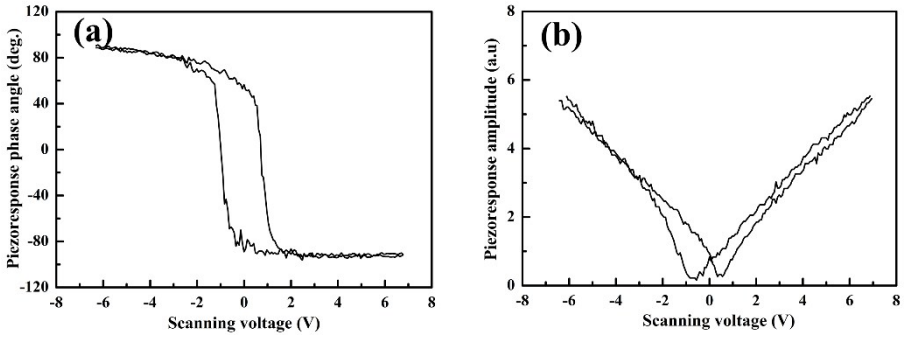

Fig. S1 Piezoresponse phase loop (a) and piezoresponse amplitude loop (b) of film with thickness of ~150 nm.

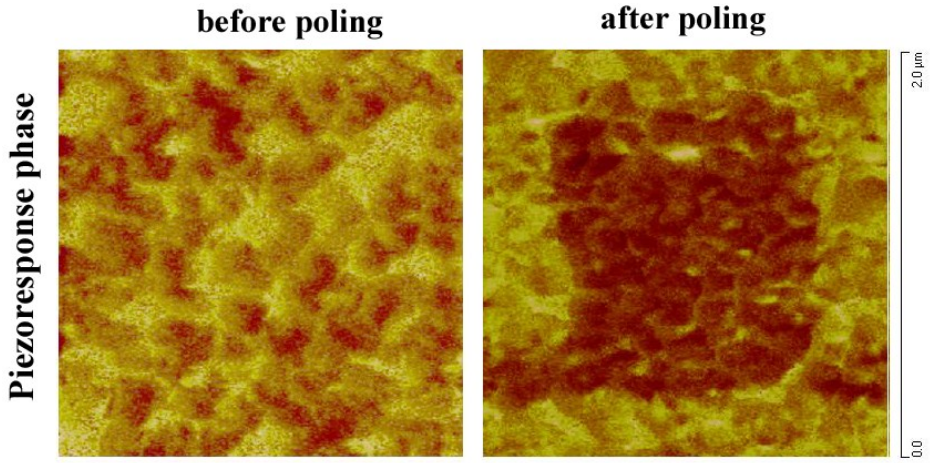

Fig. S2 Out-of-plane piezoresponse phase images of film with thickness of ~150 nm.

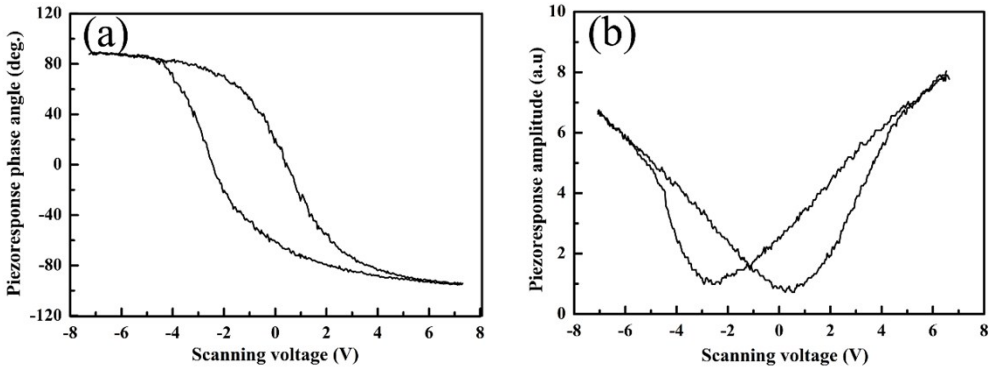

Fig. S3 Piezoresponse phase loop (a) and piezoresponse amplitude loop (b) of film with thickness of ~230 nm.

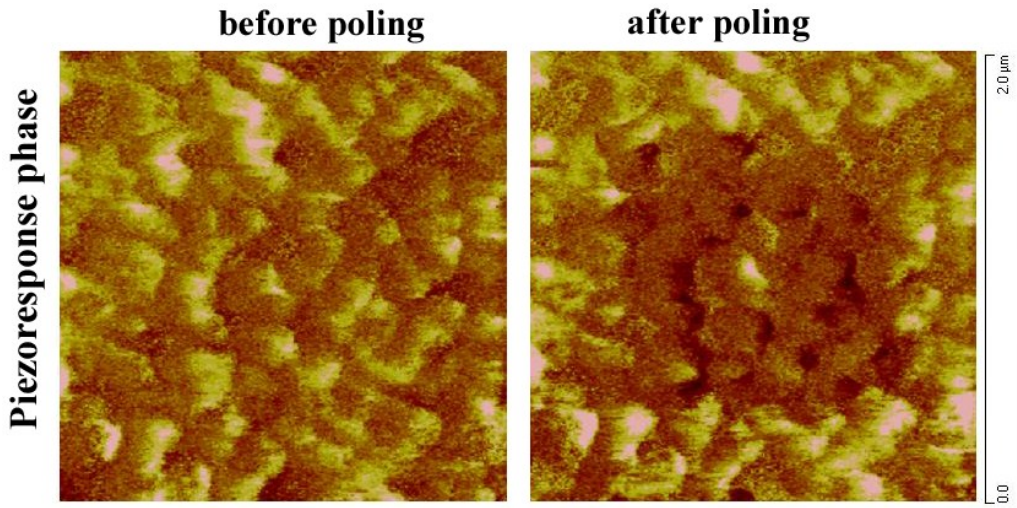

Fig. S4 Out-of-plane piezoresponse phase images of film with thickness of ~230 nm.

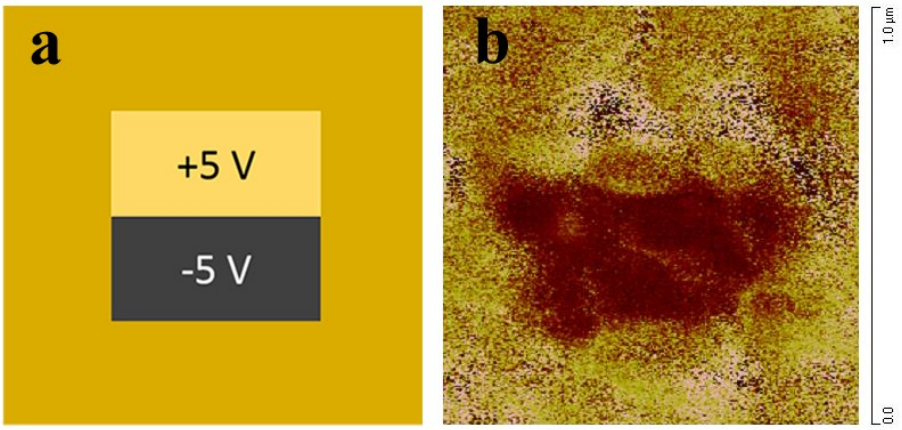

Fig. S5 Out-of-plane piezoresponse phase image of film with thickness of ~150 nm after by performing cantilever based electrical lithography to write electrical domain on the film. Schematic for performing electrical lithography (a); out-of-plane piezoresponse phase image (b).