

Electronic Supplementary Information

Robust, High Density Zinc oxide Nanoarrays by Nanoimprint Lithography-Assisted Area Selective Atomic Layer Deposition

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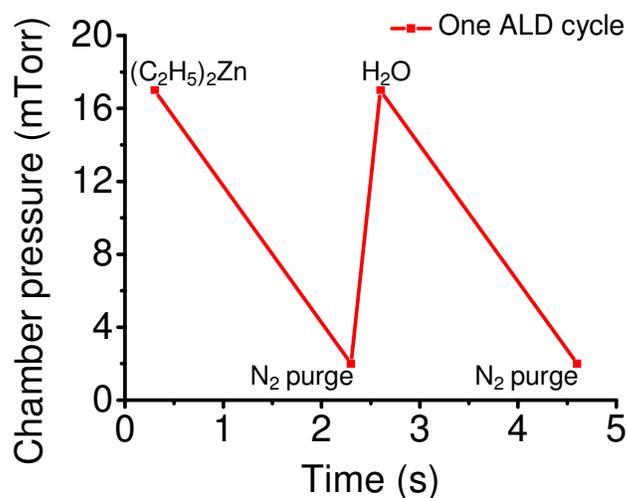


Figure S1. Plot of chamber pressure versus time for one ALD cycle

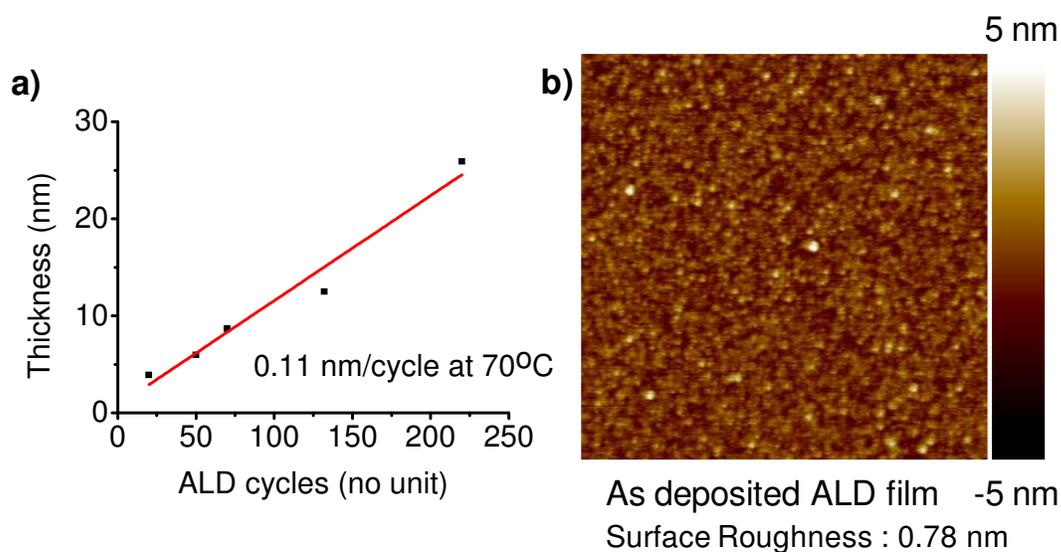


Figure S2. a) Plot of ZnO film thickness Vs ALD cycles at 70°C and b) Tapping mode AFM image ZnO thin film (100 cycles) deposited on plain Si showing a roughness of ~ 0.7 nm

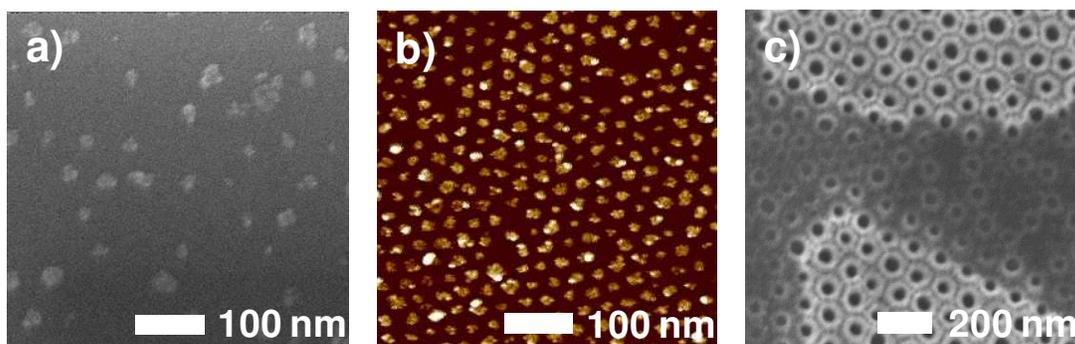


Figure S3. ALD conditions a) 50 cycles b) 100 cycles and c) 200 cycles for fabricating ZnO nanoarrays after ultrasonication in acetone, showing 100 cycles to be optimal in delivering discrete ZnO arrays

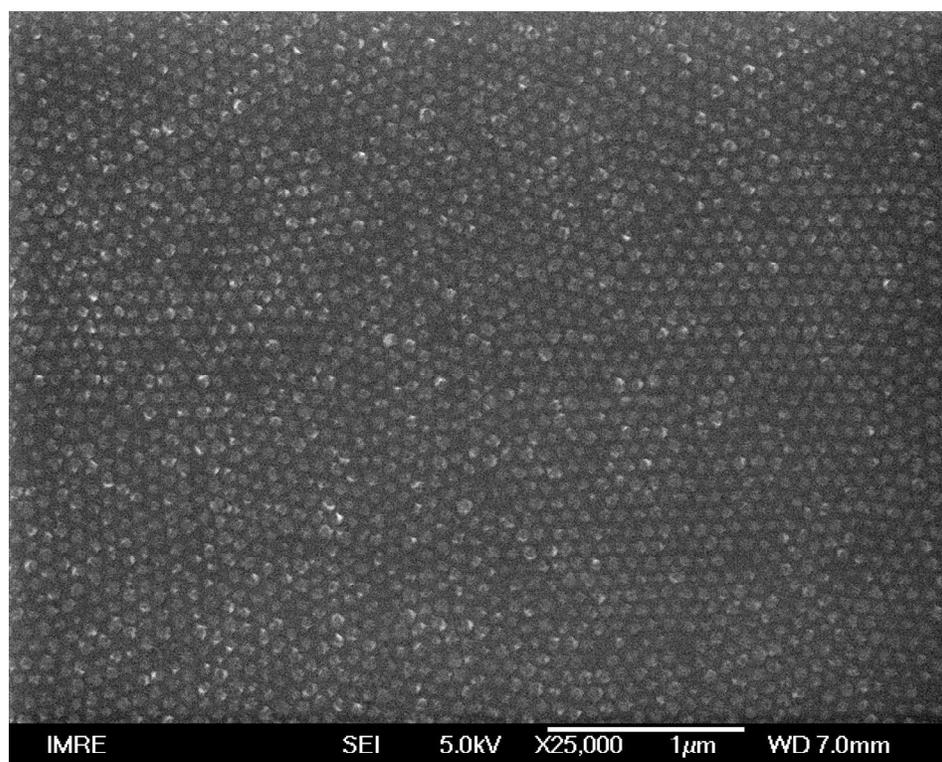


Figure S4. Representative FESEM measurement of ZnO nanopatterns performed in low-magnification

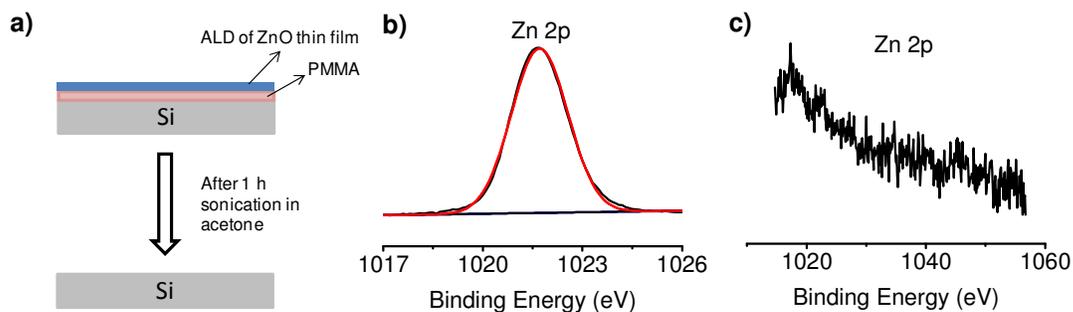


Figure S5. a) Schematic shows ALD of ZnO on PMMA thin film and the removal of ZnO upon lifting off PMMA by sonication in acetone. XPS of Zn 2p b) before and c) after PMMA lift-off showing complete removal of ZnO after lift-off is performed.

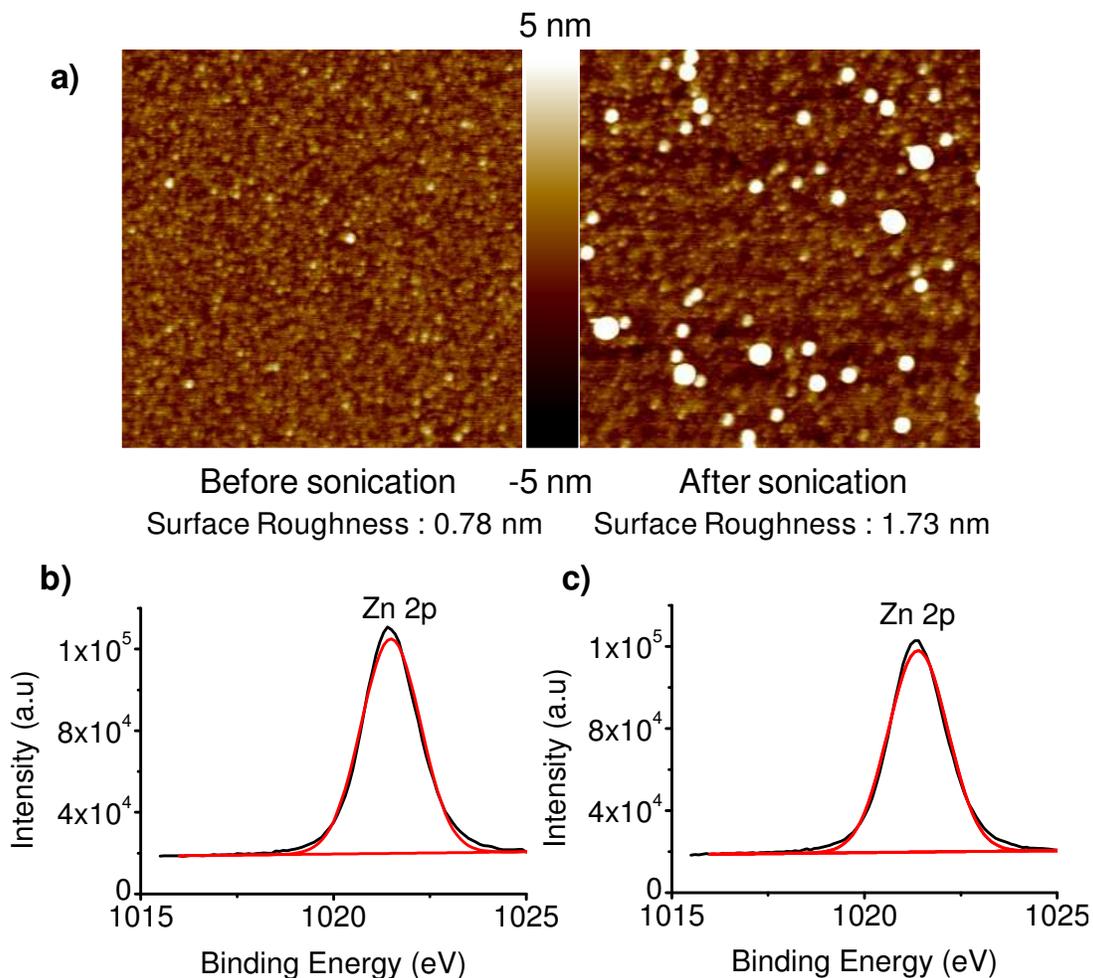


Figure S6. a) Tapping mode AFM images of ZnO thin film obtained with 100 cycles of ALD on bare OH-terminated Si before and after ultrasonication for 1h in acetone. XPS of Zn 2p peaks of the respective substrates is shown below. XPS intensities show no appreciable

change (b) before and c) after ultrasonication suggesting no loss of material occurred upon sonication.

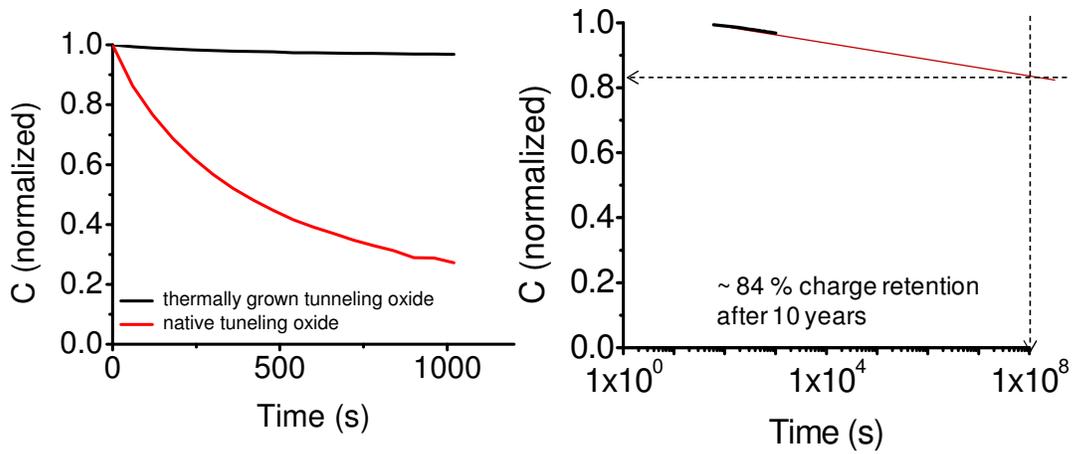


Figure S7. (left) Capacitance-time characteristics of the ZnO arrays on native oxide as compared to the thermally grown oxide tunneling layers. (right) Extrapolated Capacitance-time characteristics of ZnO arrays on 3 nm thermally grown tunneling oxide showing 84 % charge retention after 10 years