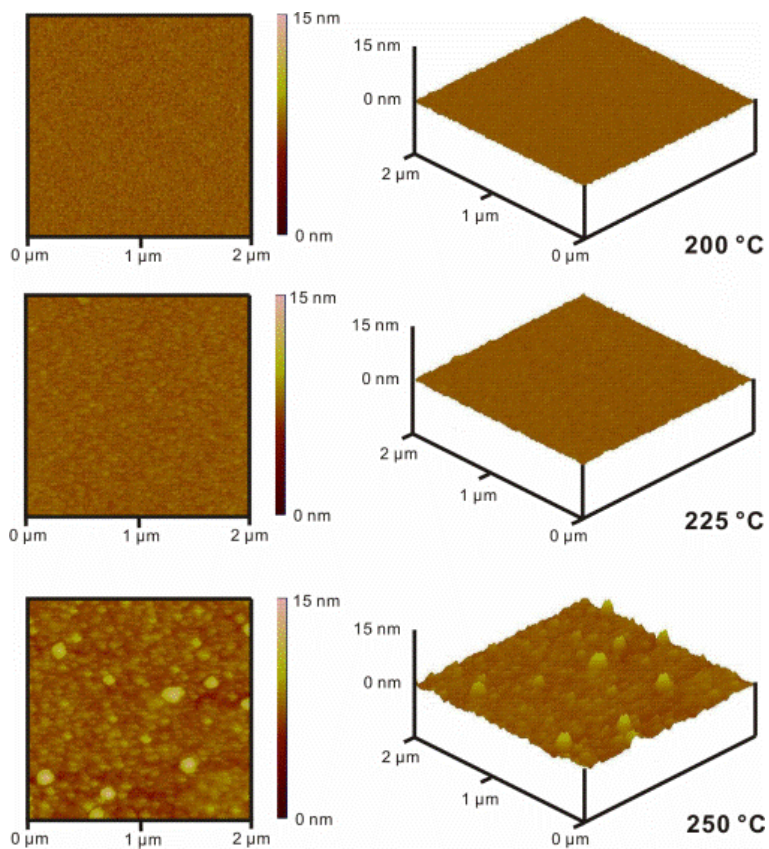


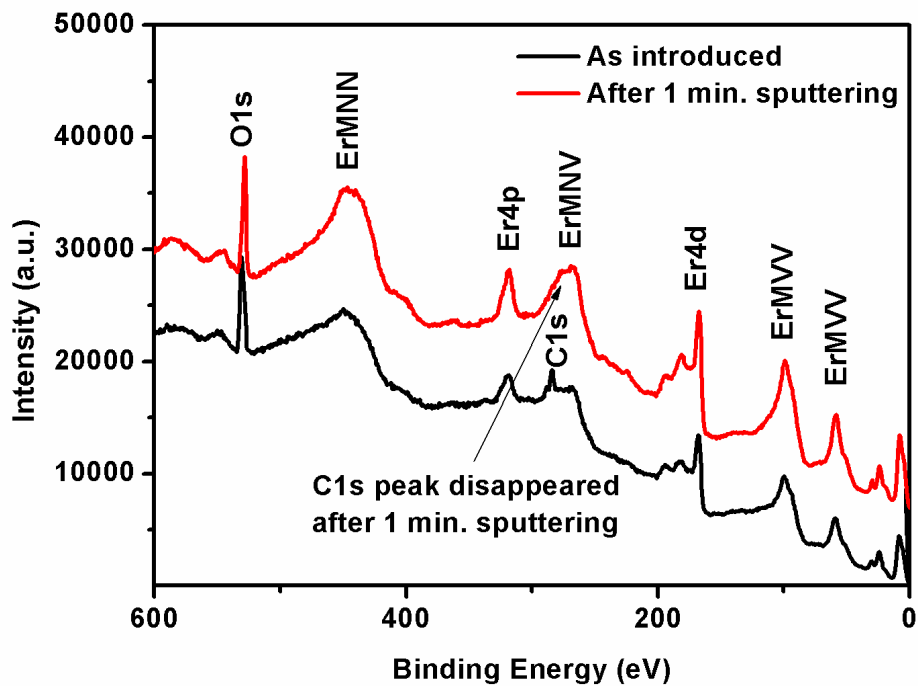
## Supplementary Information

SI-Fig. 1: AFM images of  $\text{Er}_2\text{O}_3$  thin films deposited at 200 °C, 225 °C and 250 °C on Si(100) substrates.

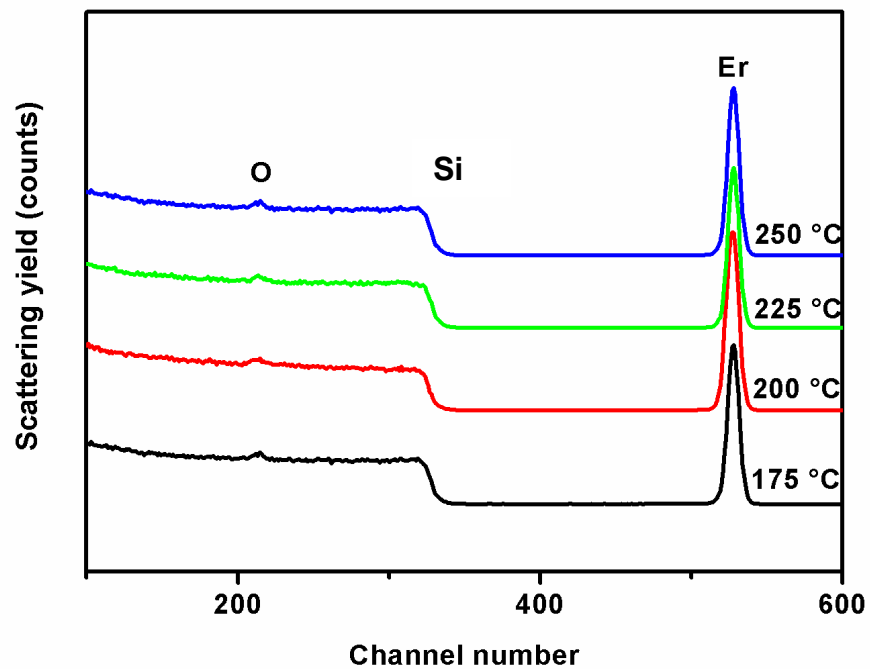


RMS roughness = 0.3 nm @ 200 °C, 0.4 nm @ 225 °C and 0.6 nm @ 250 °C

SI-Fig. 2. XPS survey spectra for an  $\text{Er}_2\text{O}_3$  thin film grown on Si(100) at 225 °C,  $\text{Ar}^+$  (1 kV, 1 min) was employed for sputtering.



SI-Fig. 3: RBS analysis of  $\text{Er}_2\text{O}_3$  thin films deposited in the temperature range 175-250 °C on Si(100) substrates.



SI-Fig. 4: O/Er ratio as a function of deposition temperature derived from the RBS data.

