

Supplementary

Investigating the Nano-Scale Structure and Composition Dynamics During the Phase Transition Towards Complete Separation of CeO₂-ZrO₂ Solid Solution

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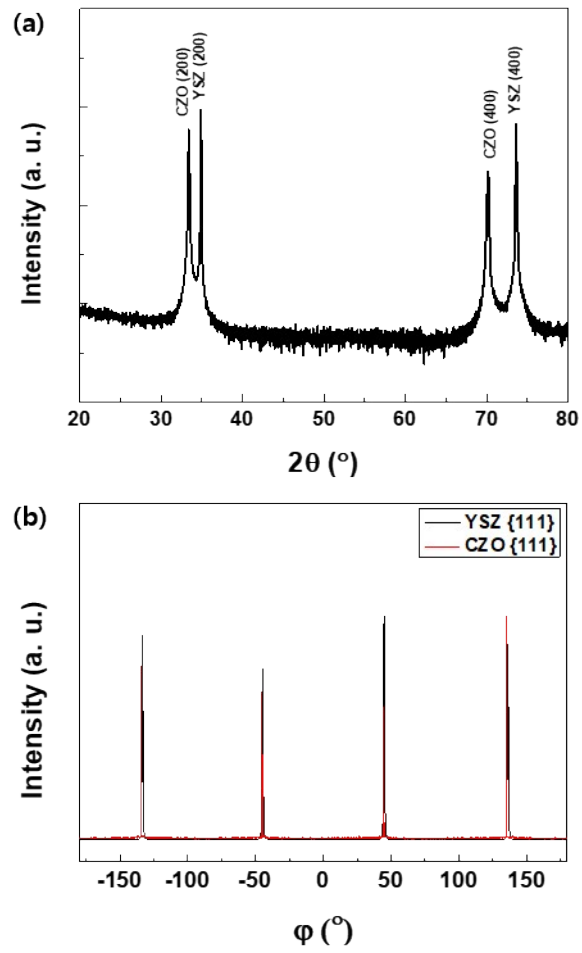


Figure S1. (a) Out-of-plane and (b) in-plane X-ray diffraction patterns of the epitaxially grown CZO thin films on YSZ (100) substrates.

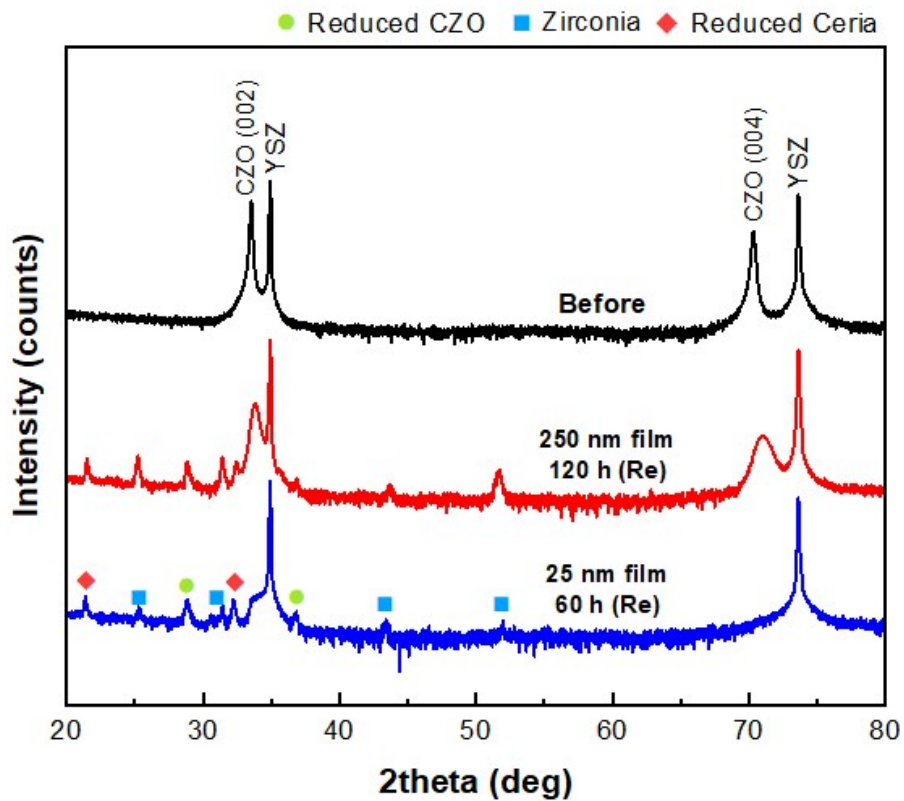


Figure S2. XRD spectra of the CZO thin film exposed to a reducing atmosphere at 1000°C

As illustrated in Figure S1, the original diffraction peak of the CZO thin film decreased significantly after heat treatment at 1000°C in a reducing atmosphere, with peaks for Ce oxide and Zr oxide appearing. This phase evolution was more pronounced in very thin films (~25 nm thick), where the CZO peak nearly vanished, leaving predominantly separated phases.

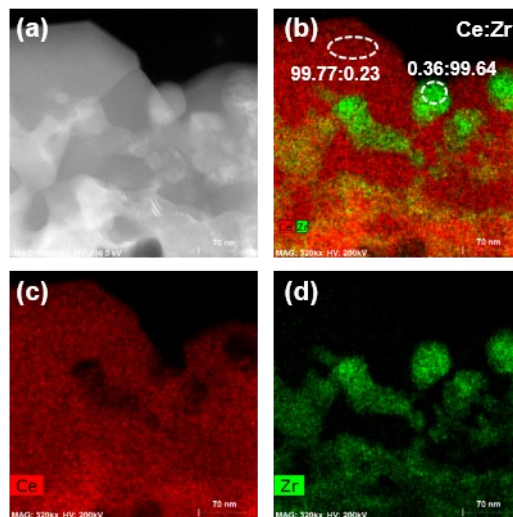


Figure S3. Observation of the completely decomposed phases in the high magnification (a) STEM image and (b-d) corresponding elemental mapping images at the surface of thin film reduced for 120 hr.