

Supplementary Information

Facile Nanopatterning of Zirconium Dioxide Films via Direct Ultraviolet-assisted Nanoimprint Lithography

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Structural Investigation of UV-irradiated ZrO₂ films: X-ray diffraction spectra

A UV-irradiated film on a quartz substrate was investigated by XRD and found to be amorphous, as shown in Figure S1. Four other similar UV-irradiated films on quartz substrates were annealed at 300, 400, 500, and 600 °C for 1 h, respectively, and examined

by XRD to investigate the effects of annealing on the film crystallinity. As shown in Figure S1, the film annealed at 300 °C remained amorphous, whereas ZrO₂ crystalline phase appeared in the films annealed at 400, 500, and 600 °C with a (111) preferred orientation. An annealing temperature of 400 °C is therefore sufficient to convert the UV-irradiated films from the amorphous to the crystalline phase. The diffraction peaks and intensities appeared similar to those of tetragonal ZrO₂ powder.^{1,2} However, it is difficult to distinguish between tetragonal and cubic zirconia at this temperature due to diffraction broadening.^{3,4} We could not rule out the presence of cubic phase zirconia in the films. The quartz substrate did not influence the growth orientation of the ZrO₂ films.

References

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Supporting Figure

Figure S1

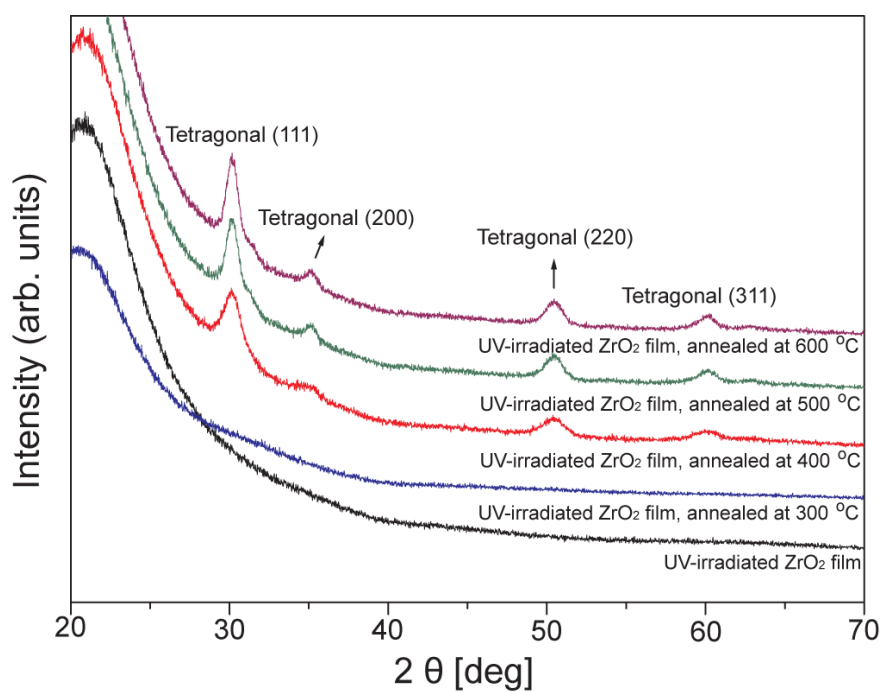


Figure S1. XRD spectra of the UV-irradiated ZrO_2 film and the films annealed at 300, 400, 500, and 600 °C for 1 h.