

Supplementary information (Rapid nanopatterning of zirconium dioxide *via* nanoprinting and microwave-assisted annealing)

To investigate the substrate effects, additional experiment was performed using non-conducting glass substrate. As shown in Fig. S1, we can also observe the rapid change of material properties such as the crystallinity- and refractive index increase within 3min under microwave assisted annealing(MAA) when we use glass substrate instead of Si wafer, which is similar to the result of Si wafer but slightly slow compared with results of Figure 2 in the main text.

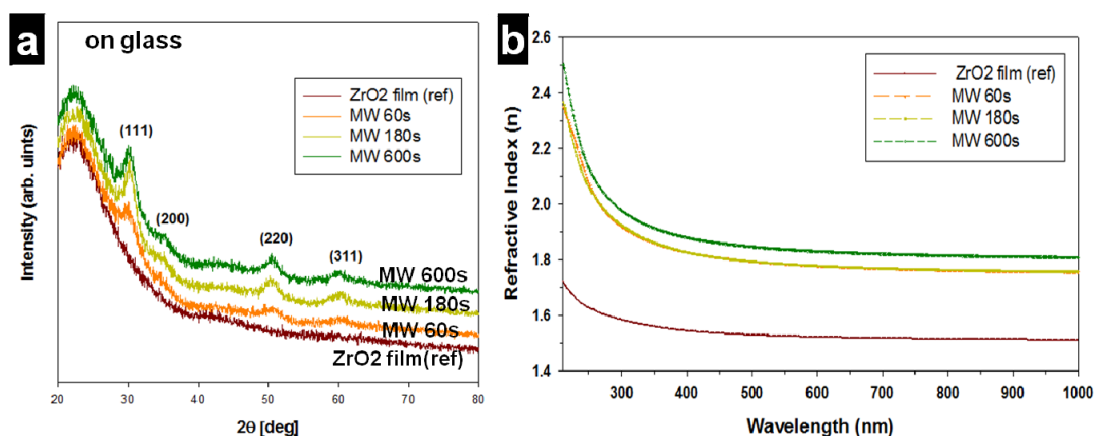


Figure S1. XRD spectra of the ZrO₂ film on glass substrate with various microwave annealing times. (b) Refractive index as a function of wavelength of ZrO₂ film on glass substrate treated with various microwave annealing times.

To investigate whether our process can apply to other material, we studied the results of ZnO using MAA process as an example of other material. As shown in Fig. S2, we can also observe the crystallinity- and refractive index increase during MAA. In our MAA process, especially, amorphous ZnO structures were readily converted to crystalline ZnO within 3min of MAA processing. All of XRD crystal peak of the (100),(002),(102), (110),(102),(112), and (201) had appeared within 3 min of MAA process, which is very similar with results in our main text using ZrO_2 .

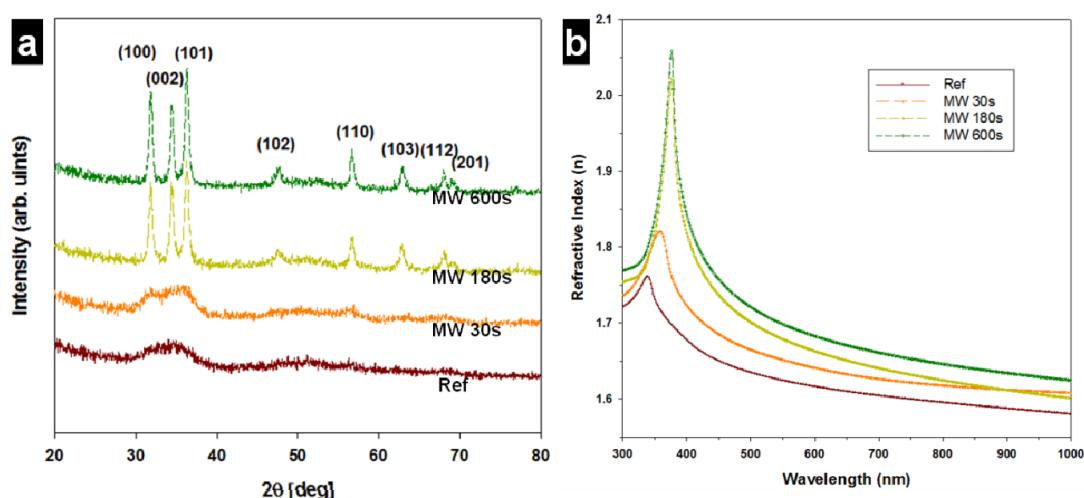


Figure S2. XRD spectra of the ZnO film with various microwave annealing times. (b) Refractive index as a function of wavelength of ZnO film treated with various microwave annealing times. (A detailed ZnO formulations and fabrication method can be seen our recent paper: Kim, S.; Shin, D. O.; Choi, D. G.; Jeong, J. R.; Mun, J. H.; Yang, Y. B.; Kim, J. U.; Kim, S. O.; Jeong, J. H., *Graphoepitaxy of block-copolymer self-assembly integrated with single-step ZnO nanoimprinting*. *Small* **2012**, 8, 1563-1569. In summary, Inorganic resin consisting of zinc acetate, 2-methylethanol, ethanolamine, and 2-nitrobenzaldehyde was used as a ZnO precursor in this experiment.)