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Supporting information for article:

High-temperature X-ray scattering studies of atomic layer deposited $\mathrm{IrO}_{2}$

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The following pages contain the extra figures that were referenced in the main paper. The figure captions contain detailed explanations of each figure.


Figure S1 X-ray reflectivity measurements in (a) oxygen and (b) nitrogen as a function of measurement temperature (open circles). Red lines correspond to the best fit. Fitting with a reasonable model was impossible for the data measured in nitrogen at above $350^{\circ} \mathrm{C}$.


Figure S2 (left) Relative changes of the density and unit-cell volume as a function of annealing temperature, (right) individual scattering length densities and thicknesses for the two-layer structure as a function of annealing temperature in an $\mathrm{O}_{2}$ atmosphere. From the left-hand side figure one can see how relative changes of density and unit-cell volume are similar. The right-hand side figure shows how the thin layer at the interface changes thickness and density during annealing and how the main $\mathrm{IrO}_{2}$ layer stays more constant.


Figure S3 The effect of the heating rate was tested by heating the $\mathrm{IrO}_{2}$ film in a nitrogen atmosphere at different rates. A $2^{\circ} 2 \theta$ window was measured while constantly heating the sample. One measurement took one minute, and the heating rate was (a) $20^{\circ} \mathrm{C} / \mathrm{min}$ or (b) $1^{\circ} \mathrm{C} / \mathrm{min}$. The results show that with the higher heating rate the phase transformation may occur at $25^{\circ} \mathrm{C}$ higher temperature than with slower heating. However, as the temperature increased $20^{\circ} \mathrm{C}$ during each fast scan, there is also a rather large error in the temperature with the higher heating rate.

