

Figure S1:

Raw data for the TPR of 3.5% wt. % IrO<sub>2</sub>/TiO<sub>2</sub> (anatase, BET = 55 m<sup>2</sup>/g) at different temperature ramping  $\beta = 10-40$  °C/min.

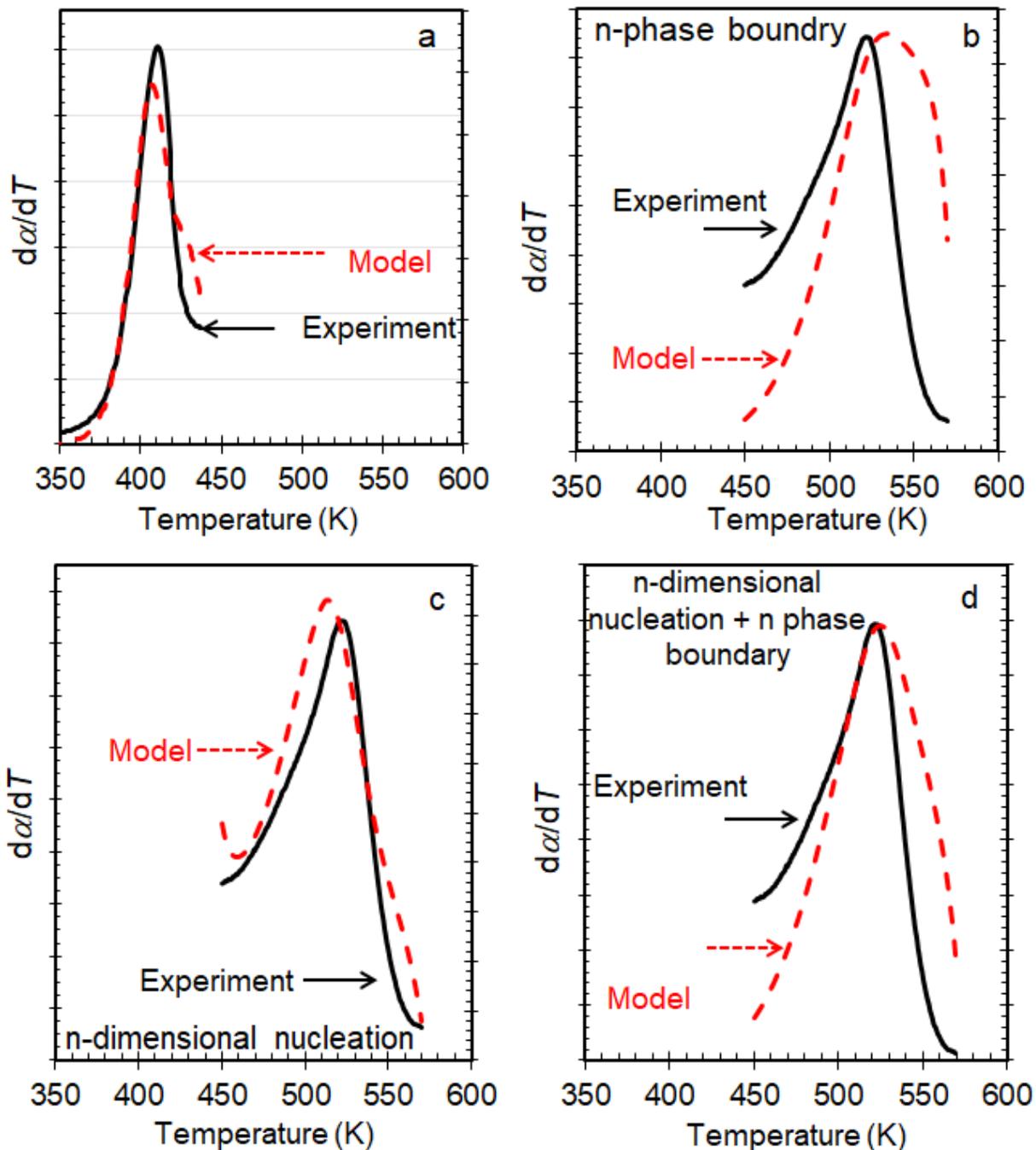


Figure S2

Fitted experimental data and calculated ( $d\alpha/dT$ ) using different reduction models (a: n-order reaction for the first reduction peak, b: Phase boundary-controlled for the second reduction peak, c: n-dimensional nucleation for the second peak, d: A (Phase boundary-controlled) + B (n-dimensional nucleation, with  $n = 3$ ) for the second reduction peak during TPR of 3.5% wt. %  $\text{IrO}_2/\text{TiO}_2$  (anatase, BET = 55  $\text{m}^2/\text{g}$ ) with  $\beta = 40^\circ\text{C}/\text{min}$ .

Best fit for d was found with  $n = 3$ ,  $A = 0.2$ , and  $B = 0.8$

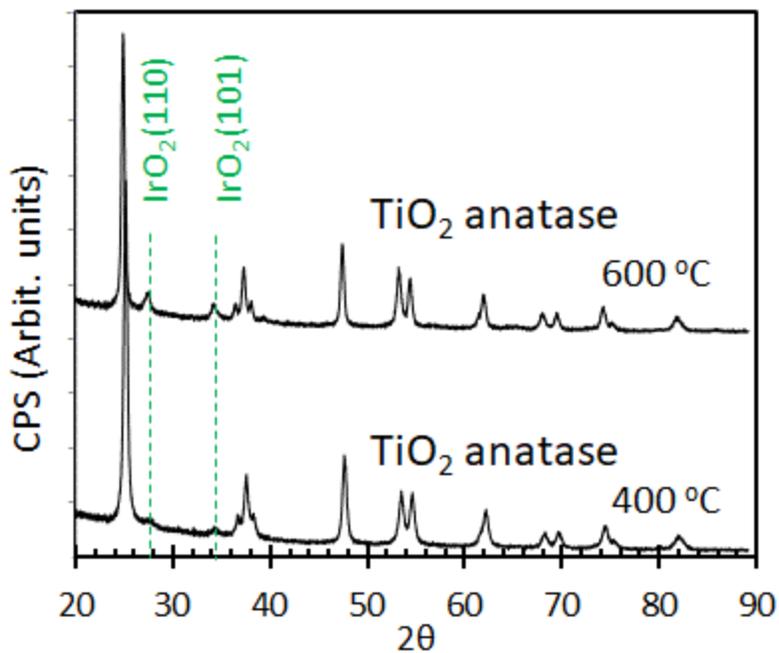


Figure S3.

XRD of 3.5 wt.% IrO<sub>2</sub>/TiO<sub>2</sub> (anatase, BET = 55 m<sup>2</sup>/g) annealed at 400°C and 600°C. No change in the anatase phase is seen. The signal related to IrO<sub>2</sub> becomes more intense. This is due to the effect of temperature on nucleation/crystallization.

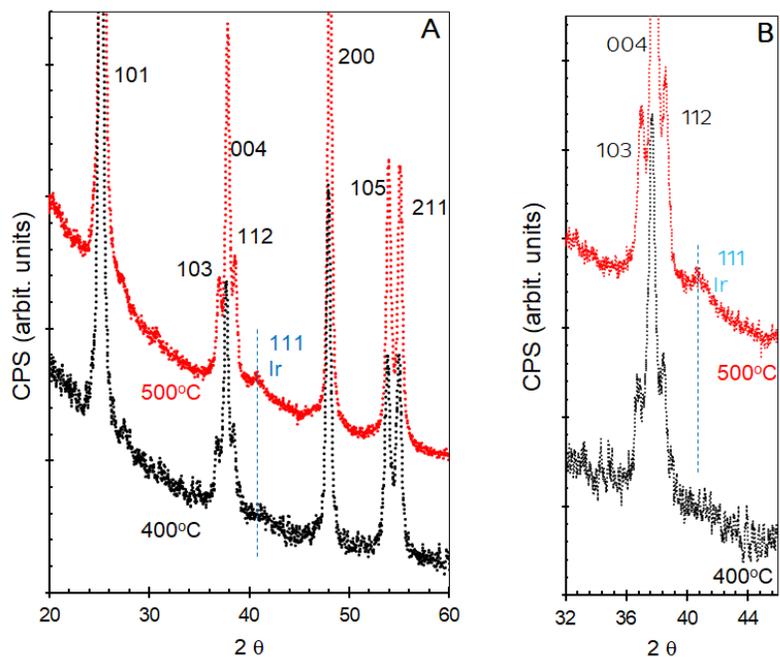


Figure S4

XRD of 3.5 wt.%  $\text{IrO}_2/\text{TiO}_2$  (anatase,  $\text{BET} = 55 \text{ m}^2/\text{g}$ ) reduced at  $400^\circ\text{C}$  (black dots) and  $500^\circ\text{C}$  (red dots) under 10 mL (10%  $\text{H}_2$  in He). The diffraction lines due to  $\text{TiO}_2$  (anatase) are given in black. (B) is a magnified region of (A). The presence of crystalline Ir metal (Ir (111) at  $2\theta = 40.57^\circ$ ) is detected for the one reduced at  $500^\circ\text{C}$  due to increased crystallinity with temperature.

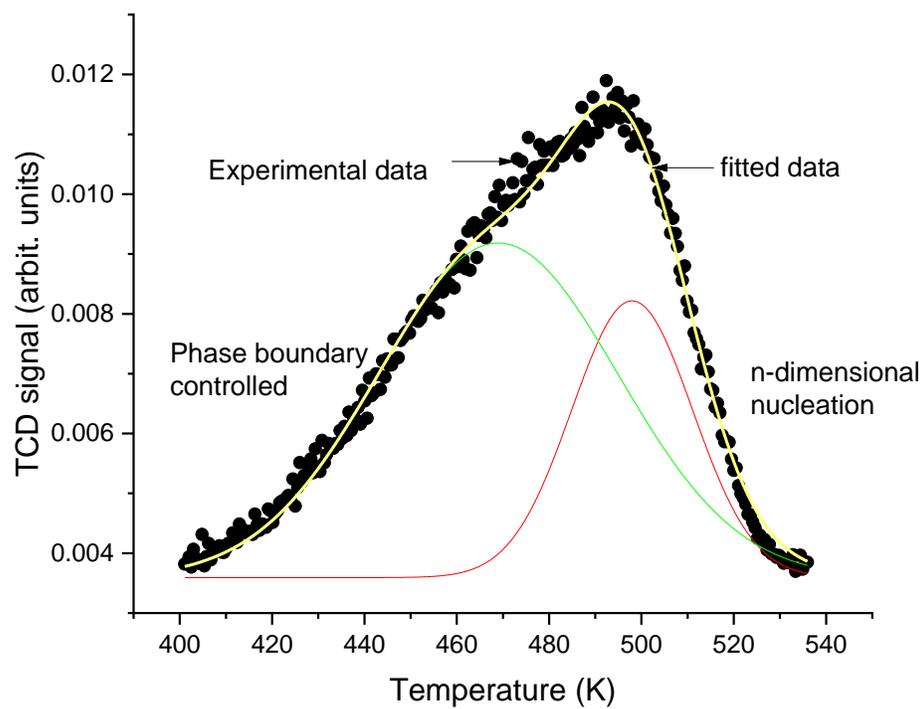


Figure S5:

Deconvoluted experimental data for the second reduction step during TPR of 3.5% wt. %  $\text{IrO}_2/\text{TiO}_2$  (anatase,  $\text{BET} = 55 \text{ m}^2/\text{g}$ ) with  $\beta = 10^\circ\text{C}/\text{min}$ .