

Supporting Information

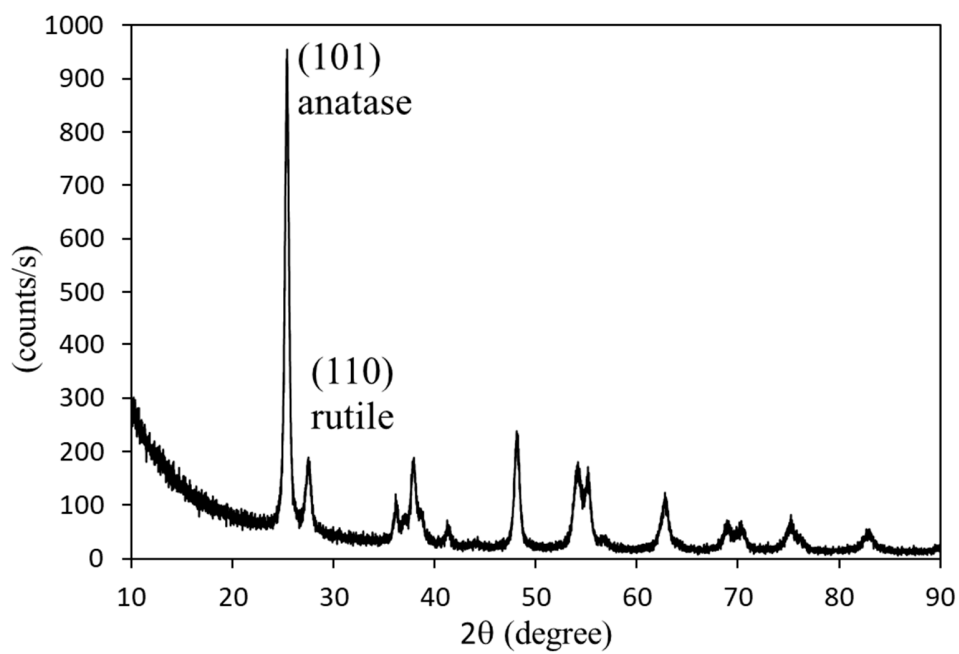


Figure S1. XRD of TiO₂ (anatase + rutile), the rutile content is 15 wt. %.

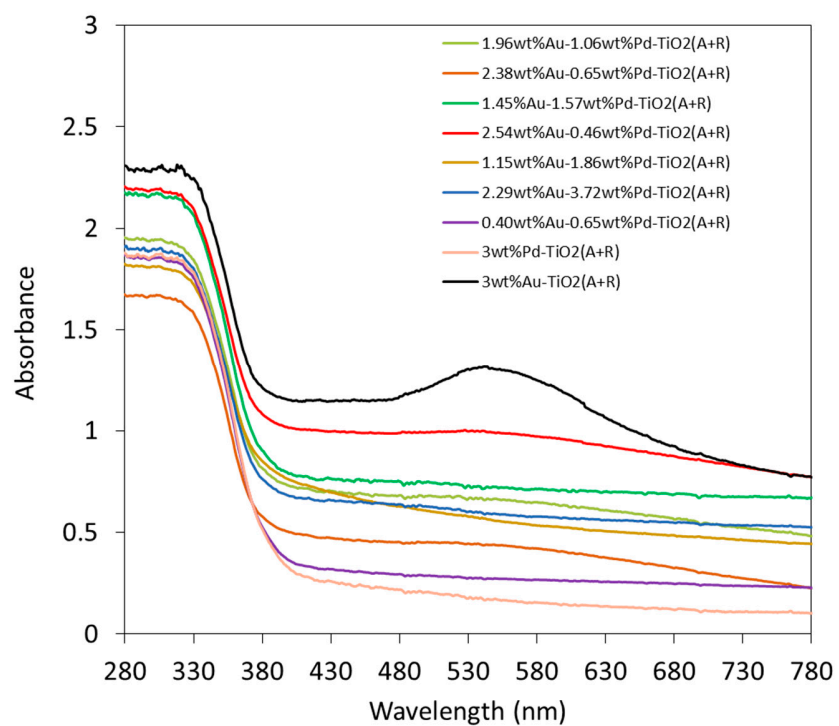


Figure S2. UV-Vis spectra of the series of catalysts studied.

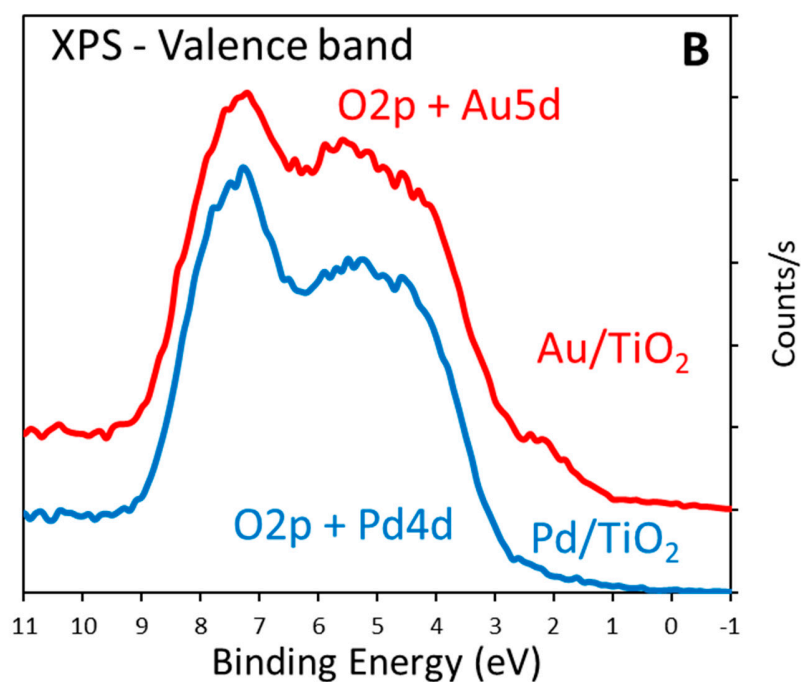
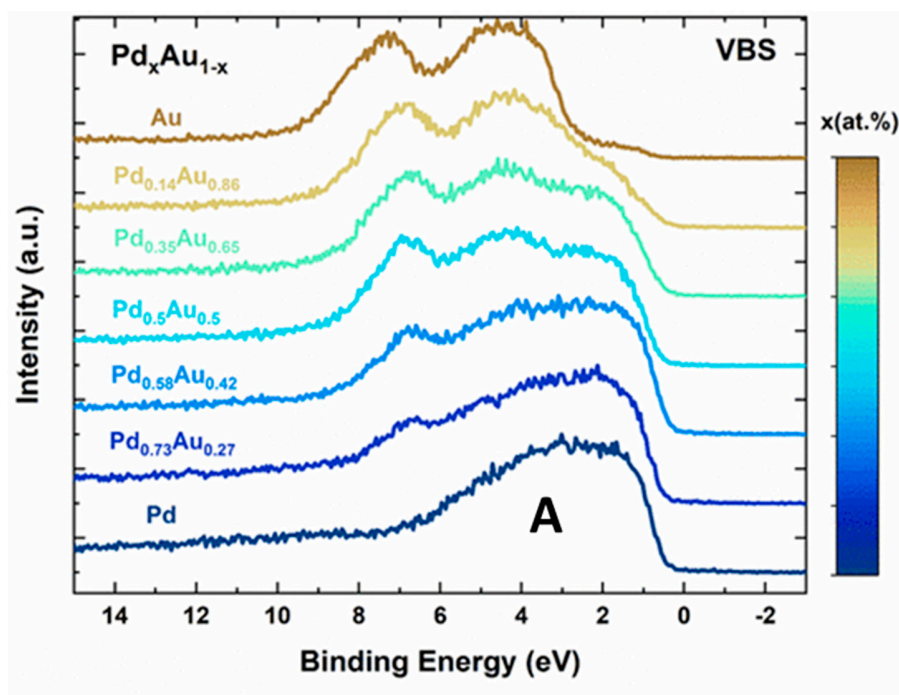


Figure S3. (A)Valence band XPS of Pd, Au and Pd-Au alloy series, from ref. 24 (printed with permission); (B) Valence band XPS of 3 wt. % Pd/TiO₂ and 3 wt. % Au/TiO₂.

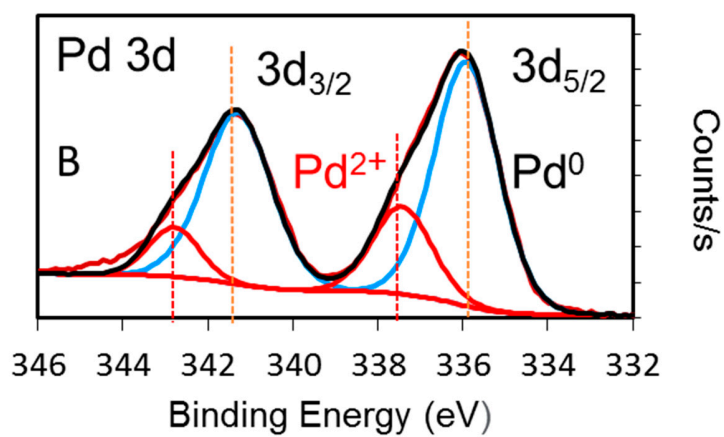
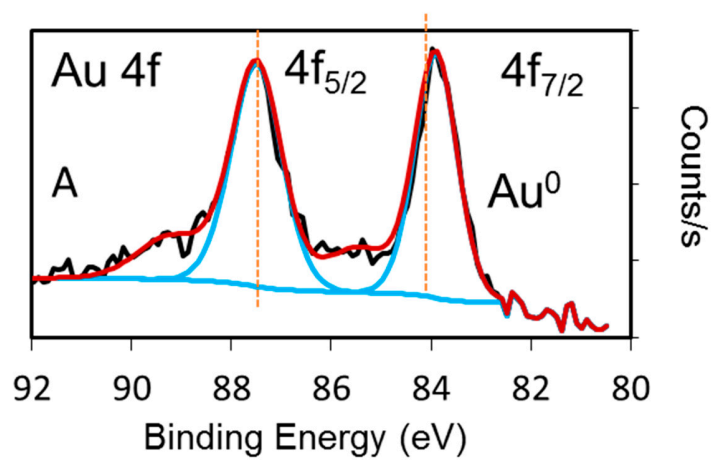


Figure S4. XPS Au 4f (A) and XPS Pd 3d (B) of as prepared 1.22 wt. % Au – 1.97 wt. % Pd / TiO₂ (anatase + rutile).

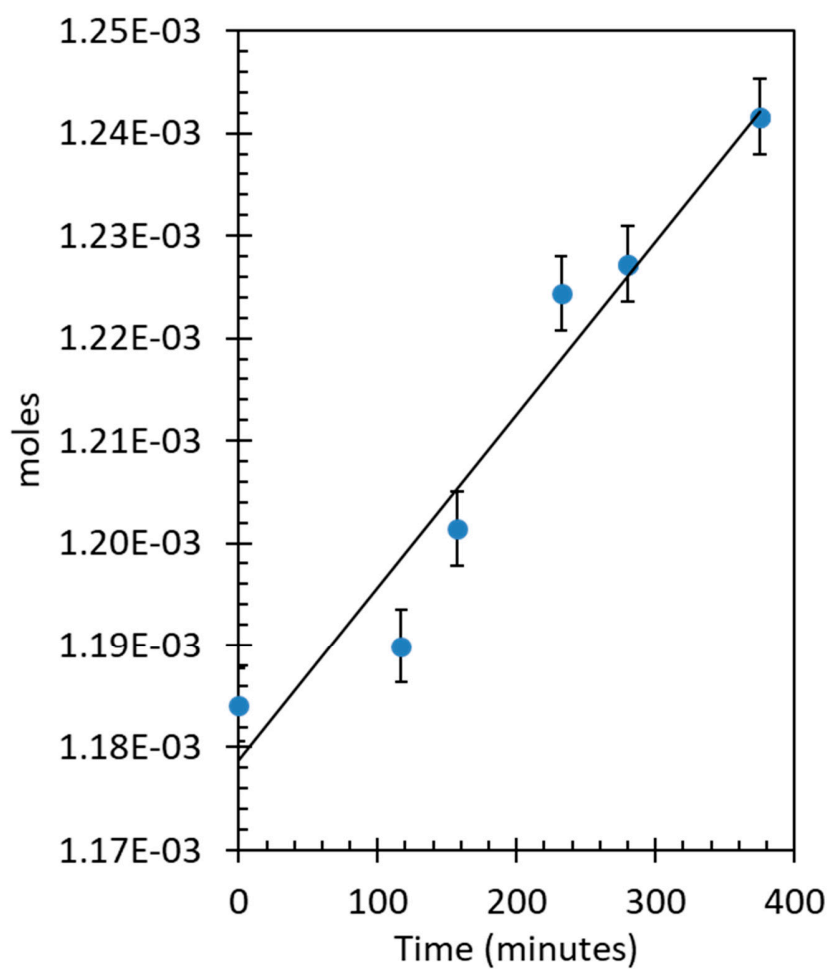


Figure S5. O_2 evolution reaction over 40 mg of same catalyst in A with 1000 mg of $Ce(SO_4)_2$ (0.15M) using 40 mg of catalyst.

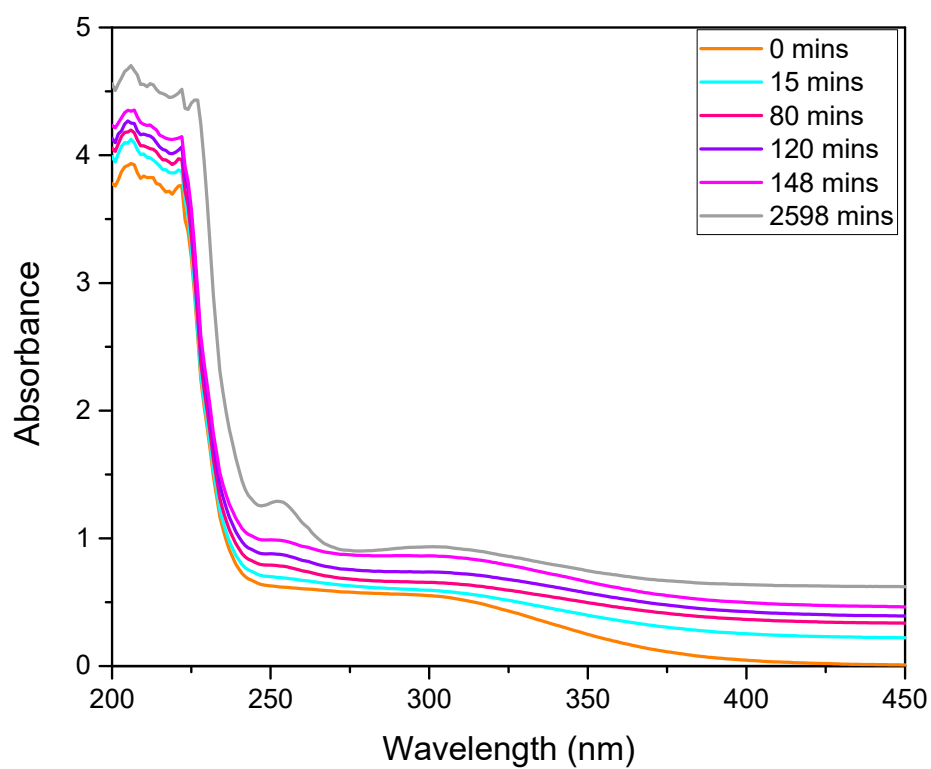


Figure S6. UV-Vis absorption spectra were obtained at different intervals of time after the addition of catalyst $\text{IrO}_2 / \text{TiO}_2$ (anatase) in 0.18 M CAN. Spectra were obtained by diluting the concentration of the mixture to 2.74×10^{-4} M (Ce concentration).

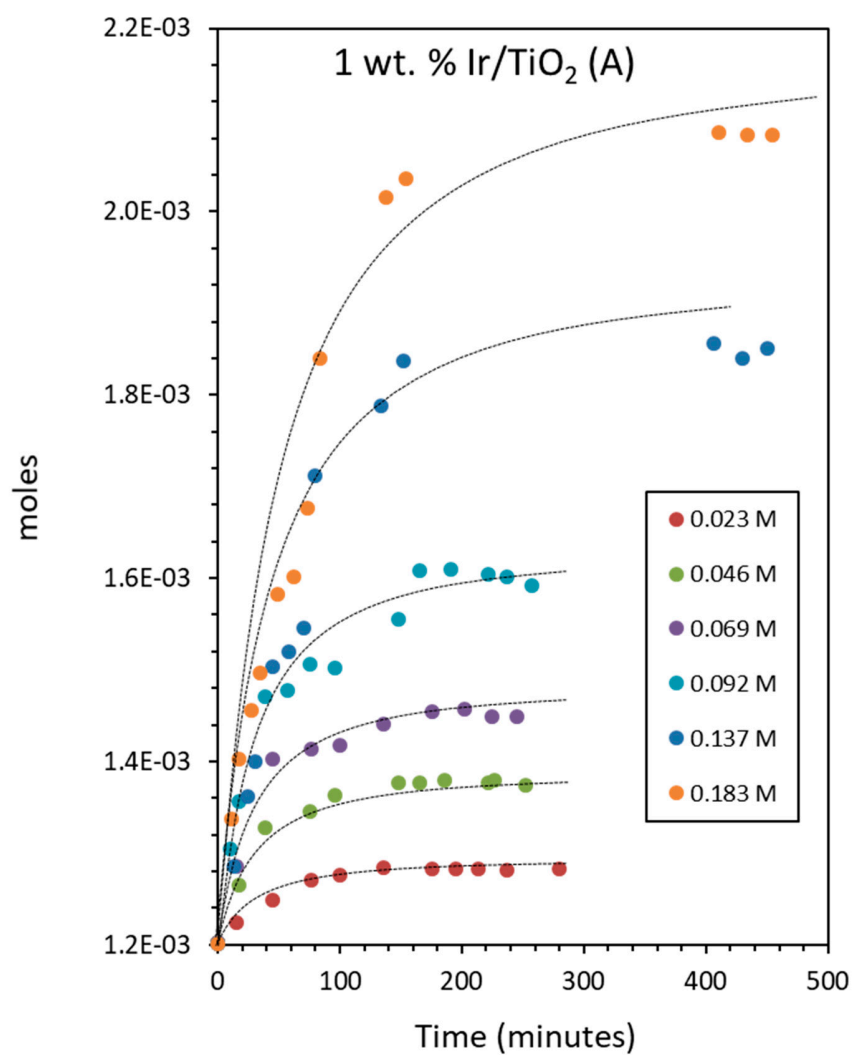


Figure S7. O₂ evolution reaction over 1 wt.% IrO₂ / TiO₂ (anatase) using 20 mg of catalyst, the concentration of CAN ranges from 0.0456-0.184 M (500-2000 mg) in 20 mL of water for prolonged periods. The lines are a guide to the eyes.

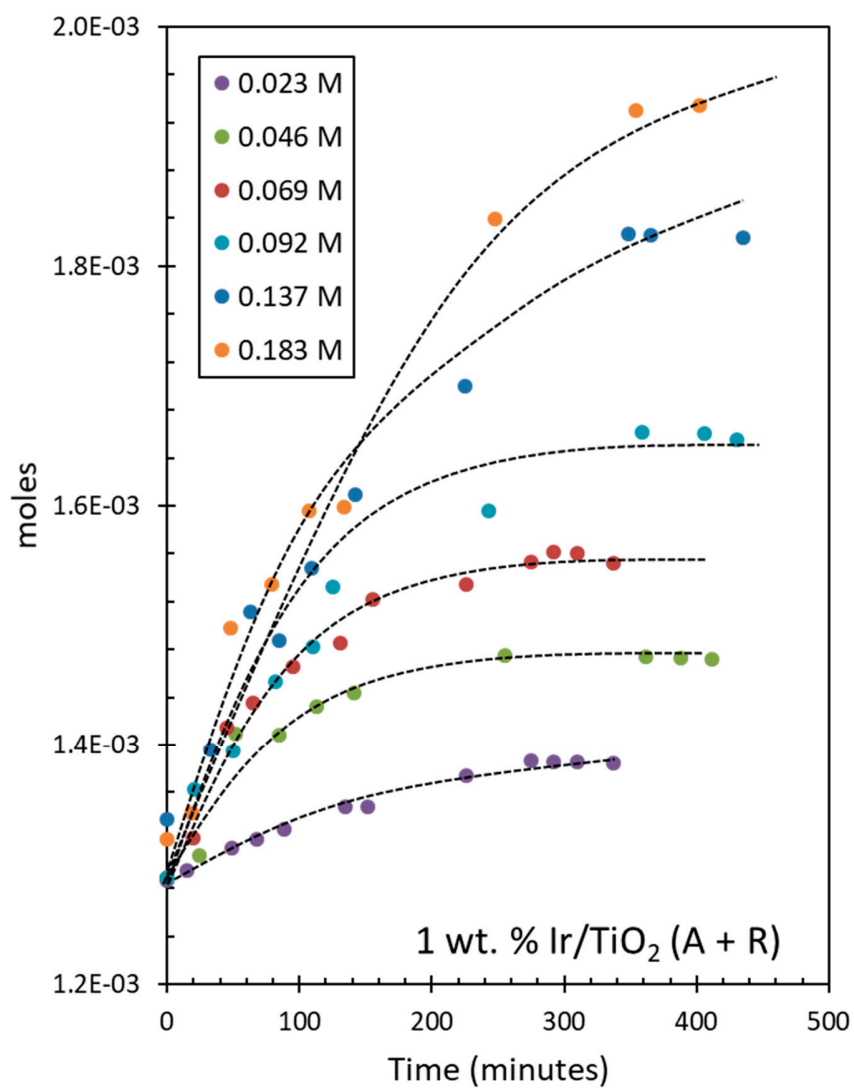


Figure S8. O₂ evolution reaction over 1 wt.% IrO₂ / TiO₂ (anatase + rutile) using 20 mg of catalyst, the concentration of CAN ranges from 0.023-0.184 M (250-2000 mg) in 20 mL of water for prolonged periods. The lines are a guide to the eyes.

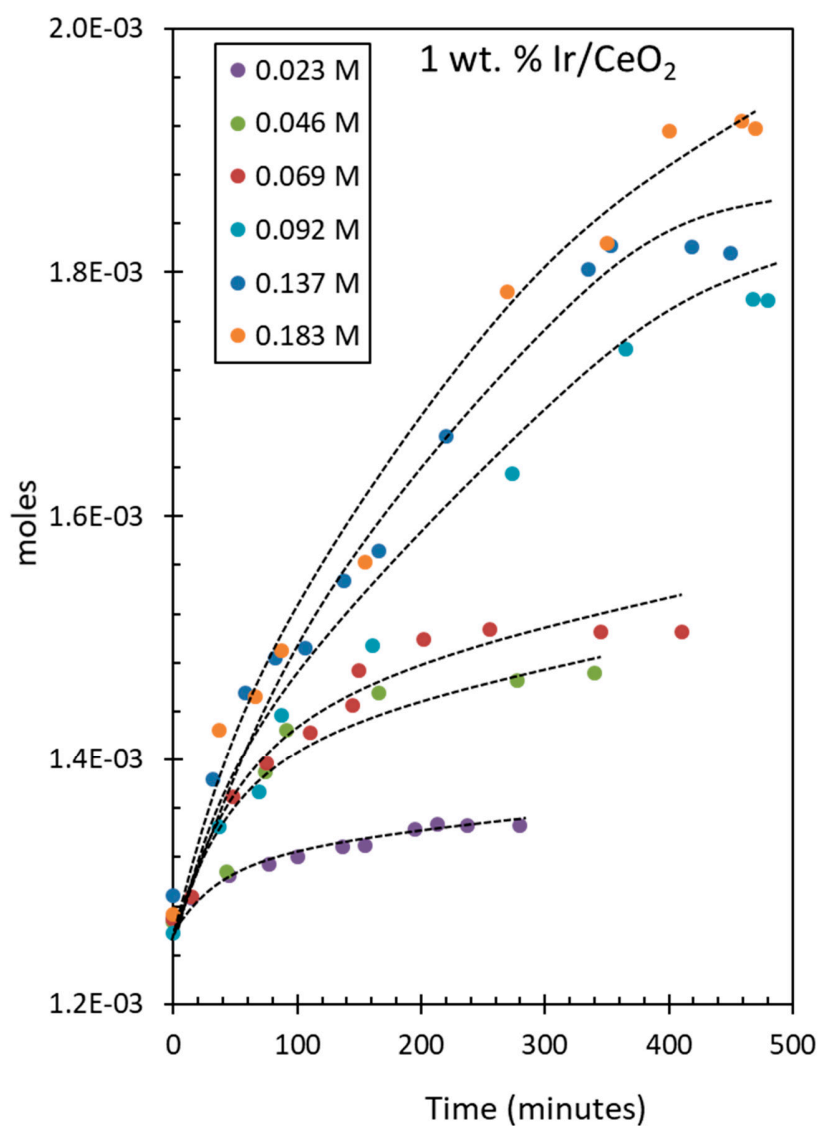


Figure S9. O₂ evolution reaction over 1 wt. %-IrO₂ / CeO₂ using 20 mg of catalyst, the concentration of CAN ranges from 0.023-0.184 M (250-2000mg) in 20 mL of water for prolonged periods. The lines are a guide to the eyes.

Table S1. Example for the calculation of TONs and TOFs for a Au-Pd catalyst with different CAN concentrations.

Catalyst: 1.45 wt. % Au – 1.57 wt. % Pd / TiO₂ (anatase + rutile). TONs are calculated after 400 minutes. TOFs are calculated from the linear part of the O₂ production (up 150 minutes).

CAN weight (mg)	O ₂ (moles)	catalyst weight (g)	Au weight (g)	moles of Au	Pd weight (g)	moles of Pd	TON moles of O ₂ / moles of metal	Rate, moles O ₂ /min	TOF (min ⁻¹) Rates/moles (Au +Pd)
250	5.76 10 ⁻⁵	0.02	0.00029	1.47 10 ⁻⁶	0.000314	2.95 10 ⁻⁶	13.02	2.89 10 ⁻⁷	0.07
500	9.38 10 ⁻⁵	0.02	0.00029	1.47 10 ⁻⁶	0.000314	2.95 10 ⁻⁶	21.20	6.32 10 ⁻⁷	0.14
750	1.67 10 ⁻⁴	0.02	0.00029	1.47 10 ⁻⁶	0.000314	2.95 10 ⁻⁶	37.75	6.96 10 ⁻⁷	0.16
1000	3.17 10 ⁻⁴	0.02	0.00029	1.47 10 ⁻⁶	0.000314	2.95 10 ⁻⁶	71.77	7.32 10 ⁻⁷	0.17
1500	4.77 10 ⁻⁴	0.02	0.00029	1.47 10 ⁻⁶	0.000314	2.95 10 ⁻⁶	107.81	1.49 10 ⁻⁷	0.34
2000	5.37 10 ⁻⁴	0.02	0.00029	1.47 10 ⁻⁶	0.000314	2.95 10 ⁻⁶	121.33	1.57 10 ⁻⁷	0.35
5000	1.99 10 ⁻⁴	0.02	0.00029	1.47 10 ⁻⁶	0.000314	2.95 10 ⁻⁶	450.10		