

Supporting information

Experimental methods

Prior to the RSM analysis, screening samples were created to identify the limit values for water content in the autoclave and the maximum temperature and time for the annealing. Different volumes of water were tested (0.2 to 30 mL) with the sample in direct contact with the water. Upon removal from the autoclave, the samples were completely deteriorated and in the cases of higher water content, only the gold remained in the FTO substrate. We therefore suspended the sample in the autoclave, using a small flask and a cork, and for the smaller water vapour pressures the samples remained macroscopically unchanged.

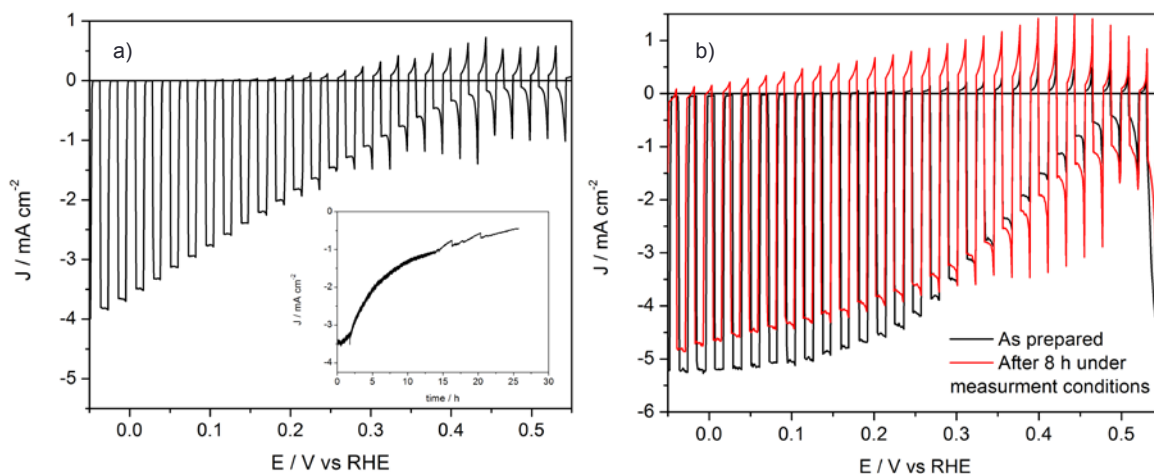


Figure S1. Current-voltage characteristics at extreme temperature and duration of steam treatment conditions: a) 180 °C for 1 h; b) 5 h at 150 °C.

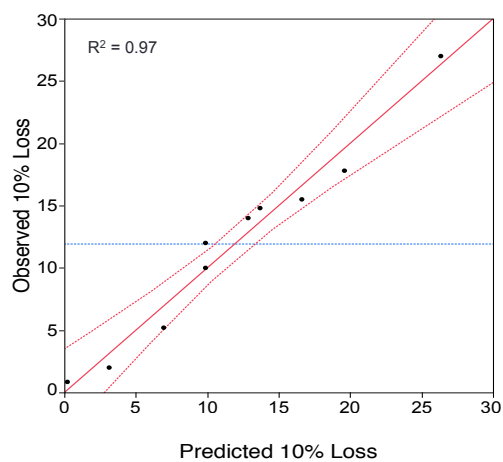


Figure S2. Analysis of variance of the modeled stability response with the respective R^2 .

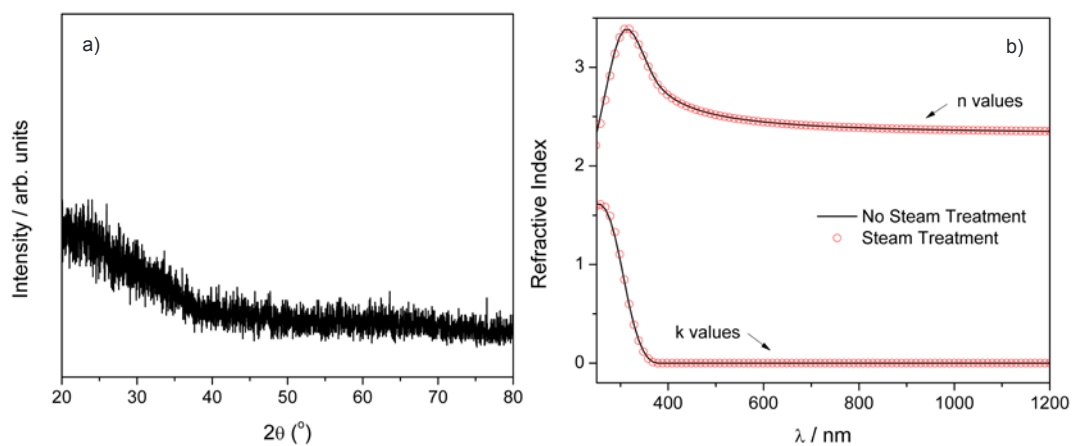


Figure S3. a) GIXRD on a TiO_2 (100nm), deposited on glass substrate, after the steam treatment at 150 $^\circ\text{C}$ for 3 h; b) Ellipsometry measurements of TiO_2 film on a silicon wafer before and after steam treatment at 150 $^\circ\text{C}$ for 3 h.

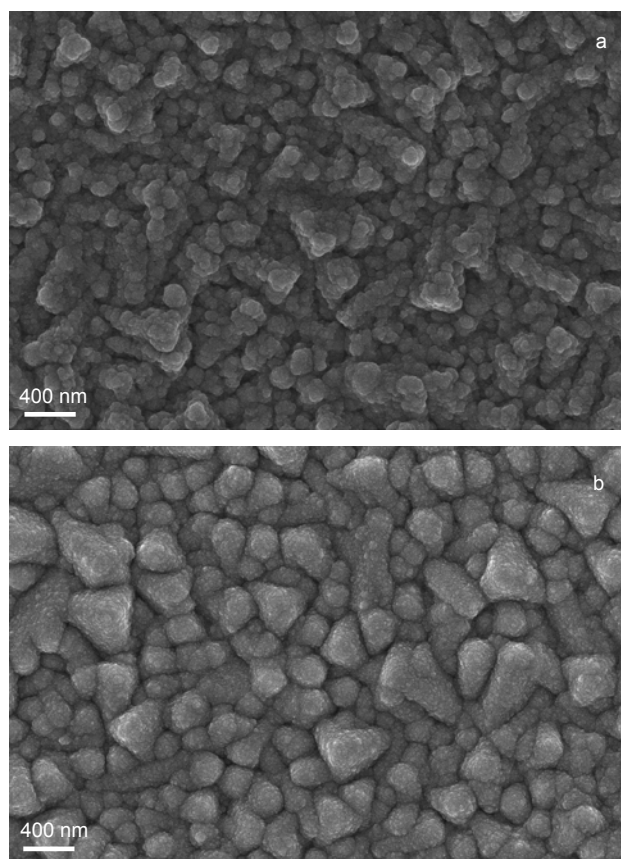


Figure S4. Photocathode SEM top view after RuO_x electrodeposition a) no steam treatment and b) after steam treatment at 150 °C for 3 h.

Table S1. CCD factors and respective levels.

Run #	Actual values	
	<i>T</i> (°C)	<i>t</i> (h)
1	150	2
2	125	1
3	100	3
4	125	2
5	125	2
6	125	3
7	150	1
8	100	1
9	100	2
10	150	3