

Hydrothermal synthesis of ZnZrO_x catalysts for CO₂ hydrogenation to methanol: the effect of pH on structure and activity

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Supporting Information

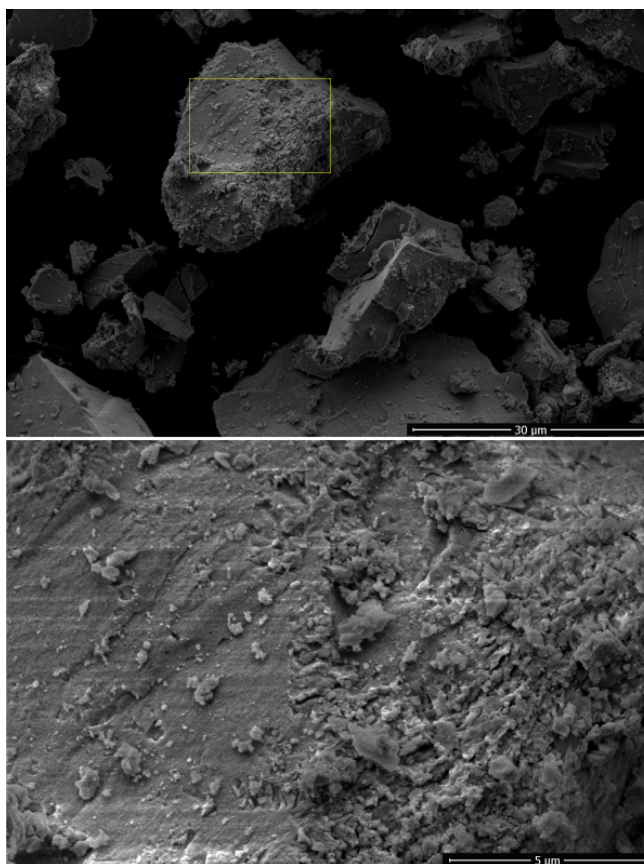


Figure S1 - SEM micrographs of ZnZrO_x produced under pH 7

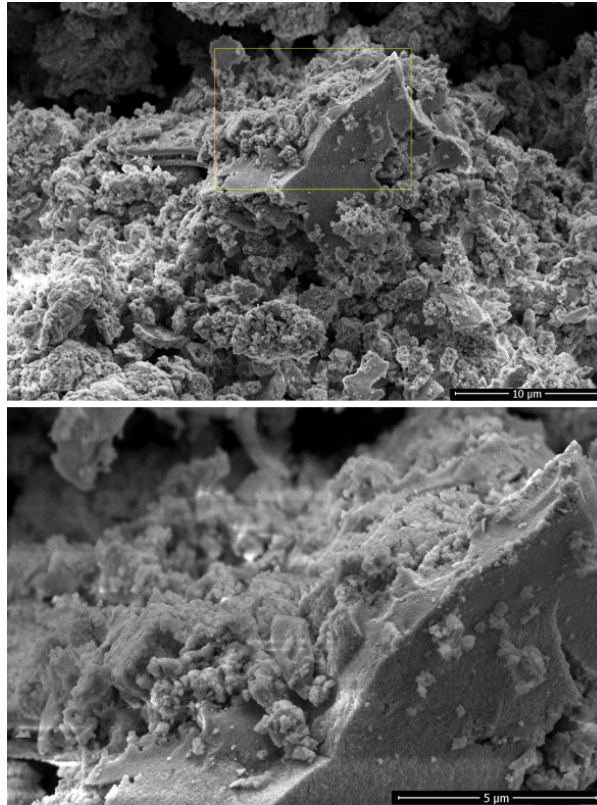


Figure S2 - SEM micrographs of ZnZrOx produced under pH 8

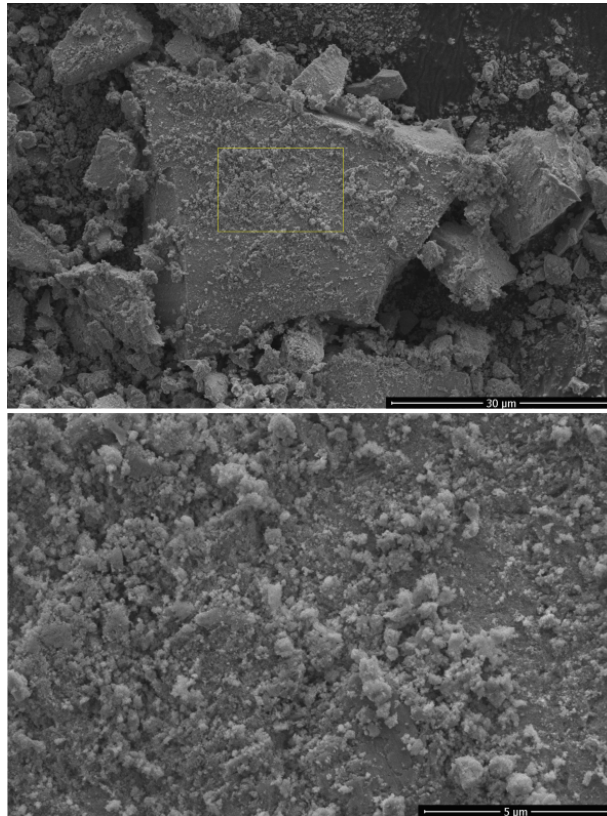


Figure S3 - SEM micrographs of ZnZrOx produced under pH 9

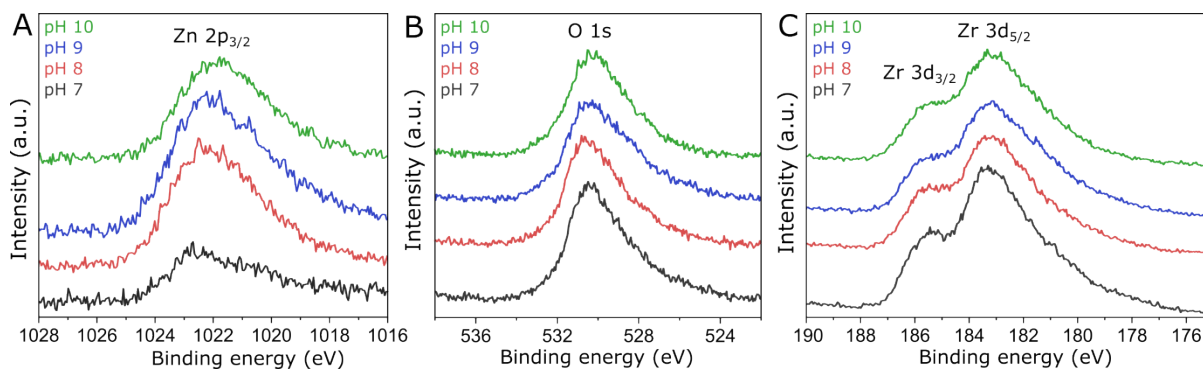


Figure S4 - High-resolution XPS spectra of samples produced at pH 7-10 using NaOH, showing Zn 2p (A), O 1s (B) and Zr 3d (C) regions.

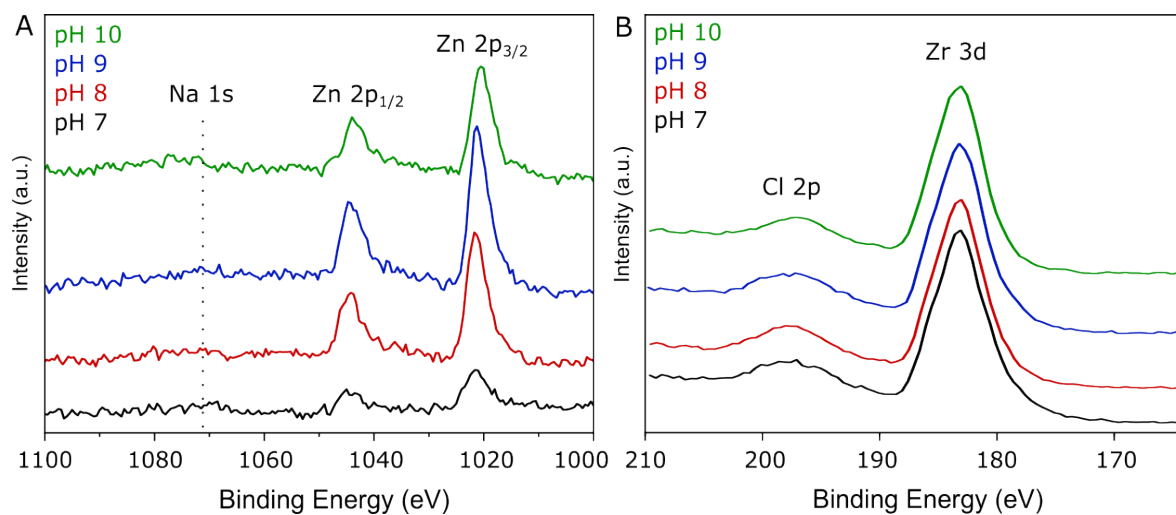


Figure S5 - Survey XPS spectra of samples produced under pH 7, 8, 9 and 10, highlighting the absence of the Na 1s peak (A) and the presence of the Cl 2p peak (B)

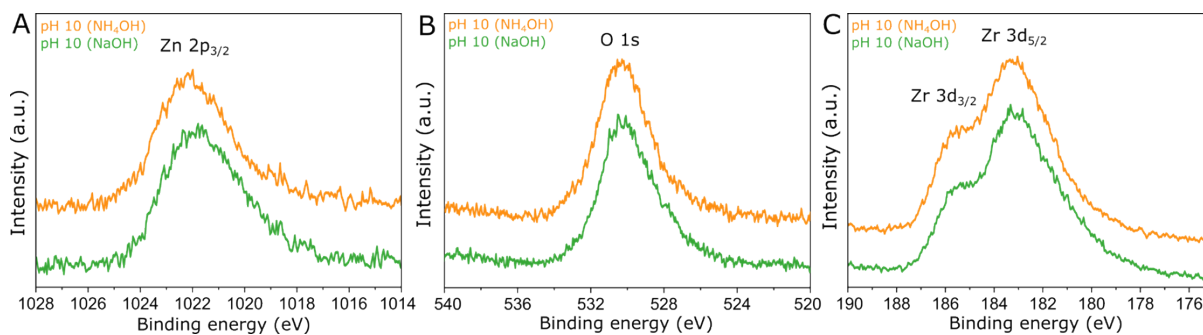


Figure S6 - High-resolution XPS spectra of samples produced at pH 10 with NaOH and NH₄OH, showing Zn 2p (A), O 1s (B) and Zr 3d (C) regions.

Table S1 - Surface properties of ZnZr produced with different synthesis pH values.

Sample	Textural properties (BET)		Zn/Zr from XPS	O/Zr from XPS
	Surface area (m ² /g)	Pore size (nm)		
ZnZrOx pH7	70	4.3	0.05	1.30
ZnZrOx pH8	67	4.8	0.72	1.39
ZnZrOx pH9	65	6.8	0.71	1.40
ZnZrOx pH10	63	10.5	0.69	1.44