

Supporting Information

Insight into deactivation behavior and determination of generation time over hydroxyapatite catalyst in the dehydration of lactic acid to acrylic acid

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Table S1. Best performances reported in literatures for LA dehydration and corresponding catalysts.

Catalyst	T (°C)	TOS (h)	LA conc. (wt%)	LA Conv. (%)	AA yield (sel.) (%)	Ref.
Na ₂ HPO ₄ /NaY	340	2	34	93	73 (79)	(Zhang et
NaOH-NaH ₂ PO ₄ -ZSM-5	350	9	30	97	76 (78)	(Zhang et
Ca ₂ P ₂ O ₇ (Ca/P= 0.76)	400	20	25	100	78 (78)	(C. Ghantani
HAP (Ca/P=1.62)	360	8	36	84	62 (74)	(Yan et al.,
HAP (Ca/P=1.55)	400	6	38	90	78 (87)	(Matsuura et
HAP (Ca/P=1.55)	400	50	38	90	70 (78)	(Matsuura et

Table S2. Composition (Ca/P molar ratio) of the hydroxyapatite catalysts.

	Ca/P molar ratio	
	Theory ^a	XRF
HAP-1.45	1.45	1.47
HAP-1.50	1.50	1.53
HAP-1.55	1.55	1.57
HAP-1.60	1.60	1.61
HAP-1.65	1.65	1.64

^aThe starting molar $\text{Ca}(\text{NO}_3)_2/(\text{NH}_4)_2\text{HPO}_4$ ratio in the preparation solution.

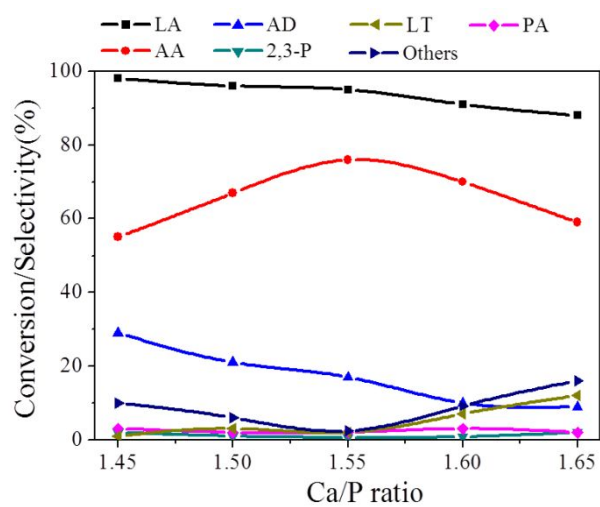


Figure S1. Effect of Ca/P ratio on catalytic performance.

Conditions: calcination temperature 500 °C; reaction temperature 350 °C; reaction time 4 h;
catalyst: 1g; particle size: 20–40 meshes; carrier gas N₂: 24 mL min⁻¹; feed flow rate: 1.2 mL h⁻¹;
LA feedstock: 40 wt% in water.

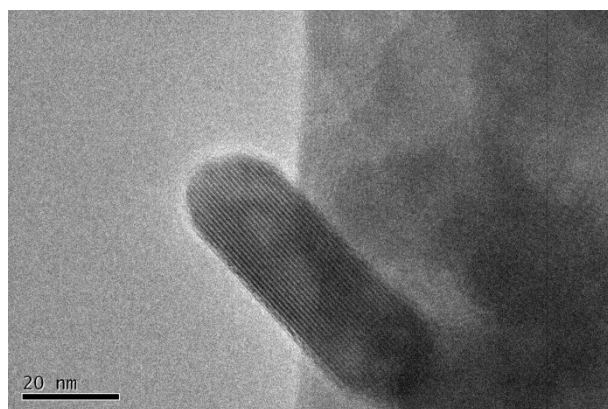


Figure S2. SEM image of the fresh HAP catalyst.

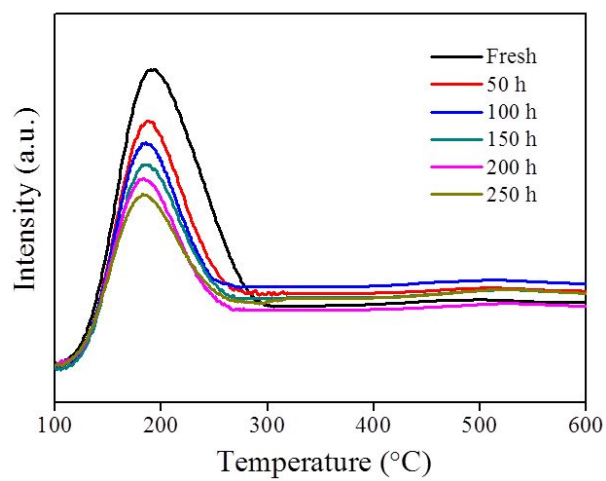


Figure S3. (a) NH₃-TPD patterns of the HAP catalysts for different TOS values

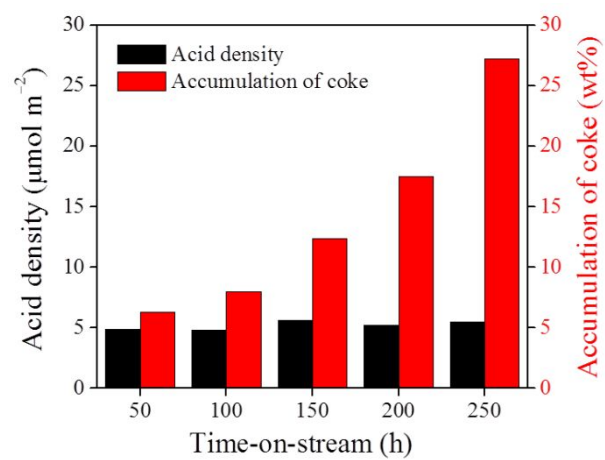


Figure S4. Relationship between acid density and coke accumulation.