

Supplementary information

Analysis and Process Evaluation of Metal Dopant (Zr, Cr)- Promoted Ga-Modified Zeolite-5 for the Oxidative Dehydrogenation of Propane in the Presence and Absence of CO₂

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Table S-1: Elemental composition of metal oxides derived from XRF analysis.

Composites	Si/Al	Ga (wt%)	Zr (wt%)	Cr (wt%)
H-ZSM-5	49.89	-	-	-
4%Ga/H-ZSM-5	49.56	4.01	-	-
4%Zr-Ga/H-ZSM-5	49..21	3.96	4.06	-
1%Cr/4%Zr-Ga/H-ZSM-5	48.96	3.95	3.94	1.02

Table S-2: Summary of catalytic test of metal doped-H-ZSM-5 zeolites in absence CO₂

Catalyst	Temp. (°C)	Conversion (mol%)	Selectivity (mol%)							TOF ^a _{C₃H₈} (h ⁻¹)
		C ₃ H ₈	C ₁	C ₂	C ₂ =	C ₃ =	C ₄ =	C ₅ =	BTX	
H-ZSM-5	400	13	15		40	19	11	6	9	
	450	22	21		30	16	10	4	19	
	500	23	25	1	28	12	7	4	23	
	550	32	27	2	33	9	6	6	27	
4%Ga/H-ZSM-5	400	28	4		5	65	7	1	18	31
	450	33	6	2	8	49	8	1	26	34
	500		8	3	9	28	19	3	30	37
	550	48	11	4	7	23	17	2	36	43
4%Zr-Ga//H-ZSM-5	400	34		1	39	6	25	2	27	36
	450	42	2	1	33	11	19	1	33	42
	500		5	1	27	17	10	2	38	45
	550	53	7	3	19	21	6	2	42	46
1%Cr/4%Zr-Ga/H-ZSM	400	45			2	60	6		32	119
	450	51	1	1	4	43	14	1	36	126
	500	55	4	1	5	26	20	3	41	127
	550	59	6	2	4	18	17	3	50	128

^a Estimated by moles of propane/product reacted or produced over per unit mole of acid cite per unit time.

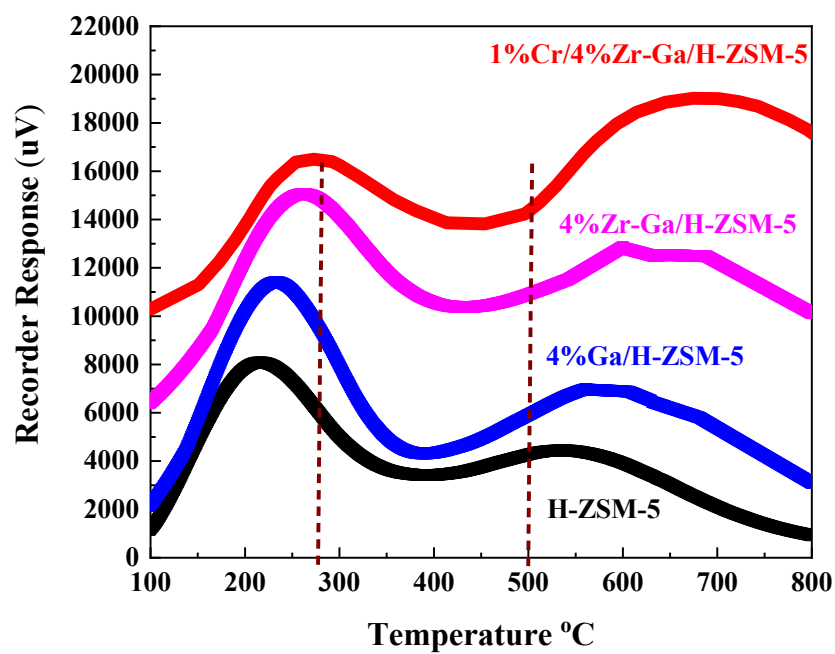


Fig. S-1. CO₂-TPD profiles of the bare and Ga-, Zr-Ga-, and Cr/Zr-Ga-doped H-ZSM-5.