Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supplementary Information

Mg and Zn co-doped mesoporous ZSM-5 as an ideal catalyst for ethane dehydroaromatization reaction

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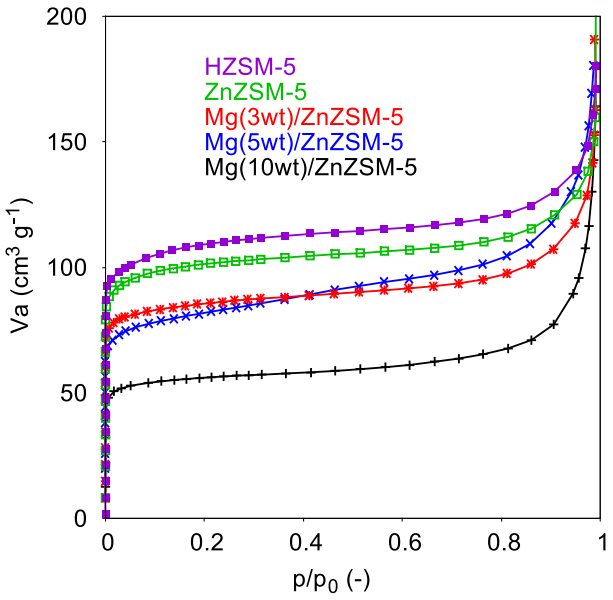

Figure S1 N_2 Adsorption isotherms of the prepared samples: HZSM-5, ZnZSM-5, Mg/HZSM-5 and Mg/ZnZSM-5 with different loading amount of Mg.

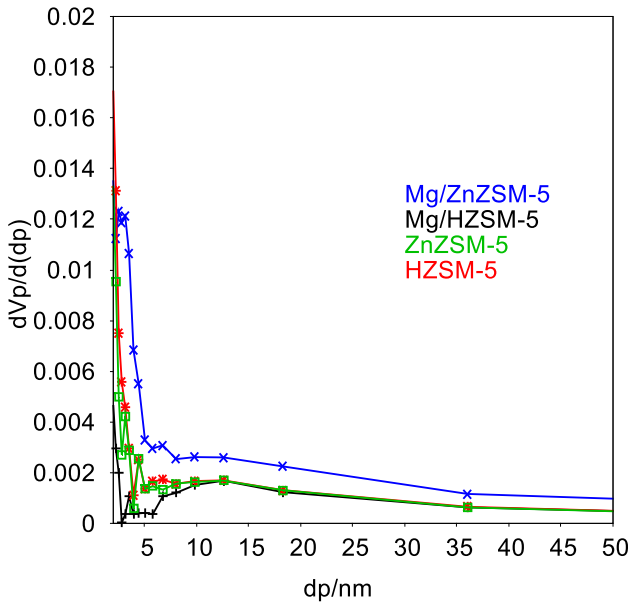

Figure S2 Mesopore size distribution of the prepared samples, measured by N_2 adsorption isotherms.

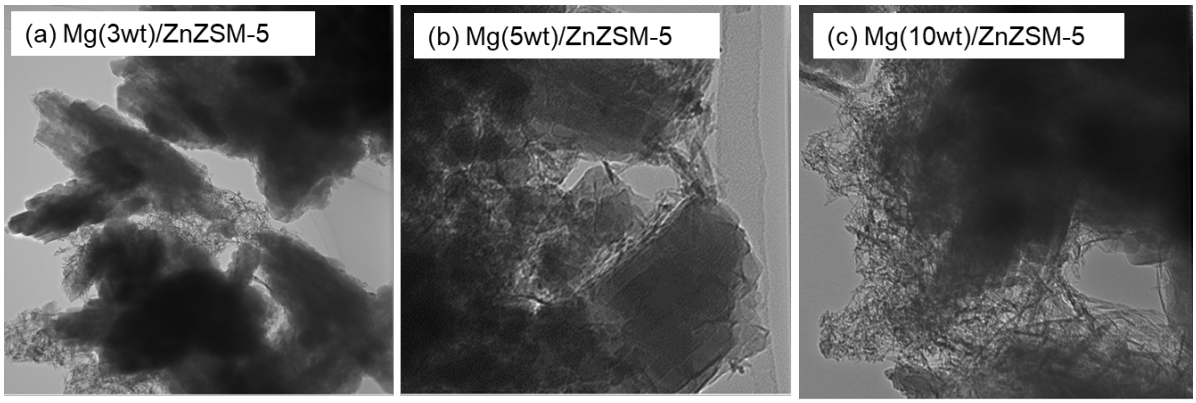

Figure S3 TEM images of Mg/ZnZSM-5 with different loading amount of Mg: (a) 3wt, (b) 5wt and (c) 10wt.

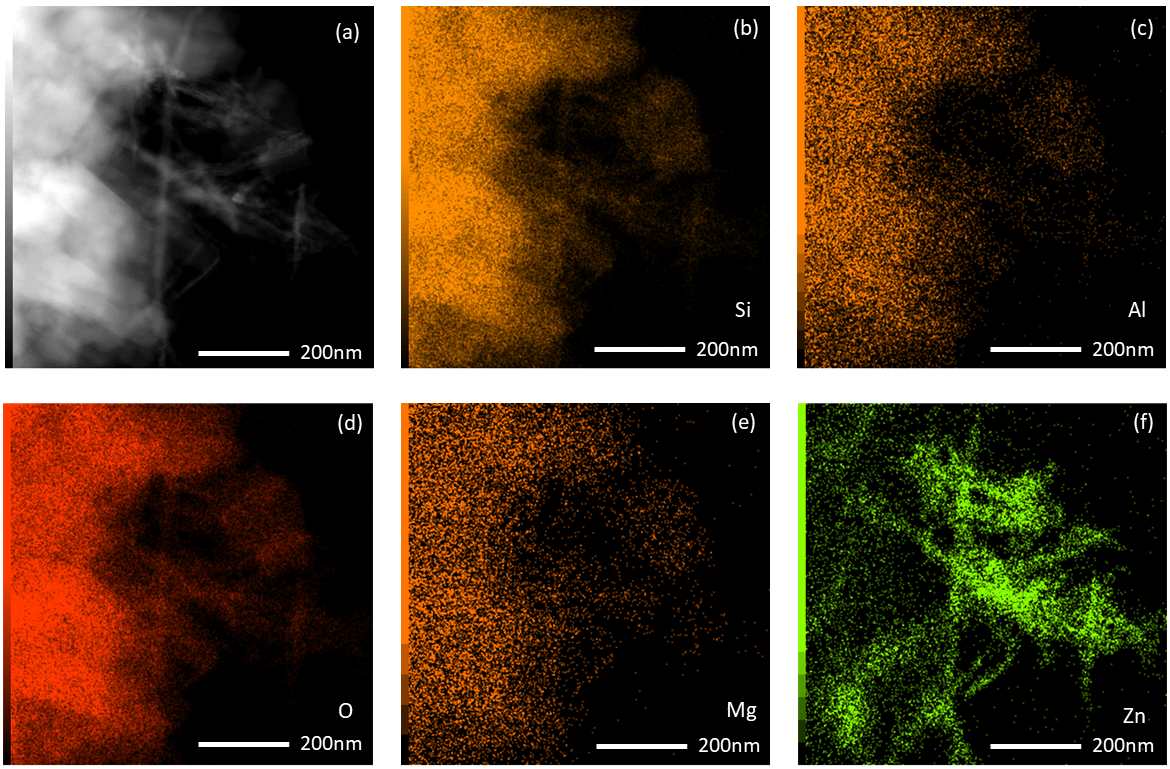

Figure S4 STEM-EDS for Mg/ZnZSM-5: (a) STEM images, (b) - (f) Spatial mapping of each element.

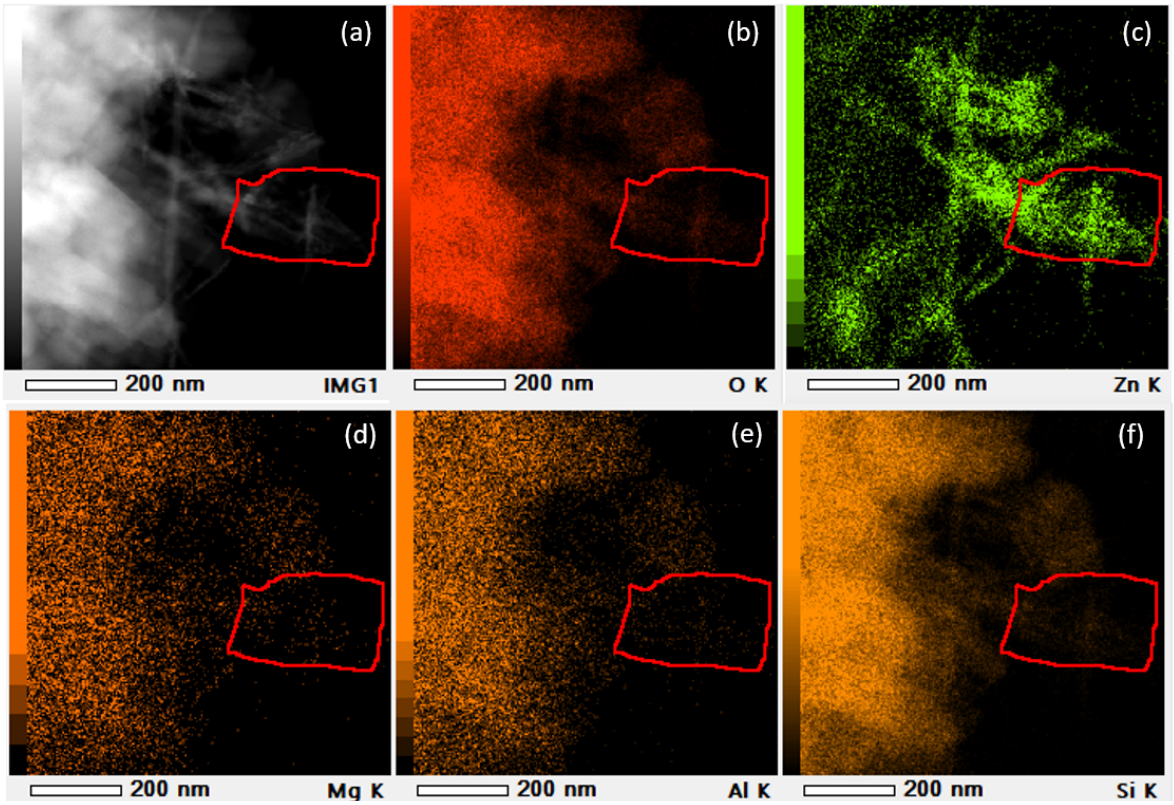

Figure S5 Local elemental analyst of Mg/ZnZSM-5 by STEM-EDS: (a) STEM images, (b) - (f) Spatial mapping of each element.

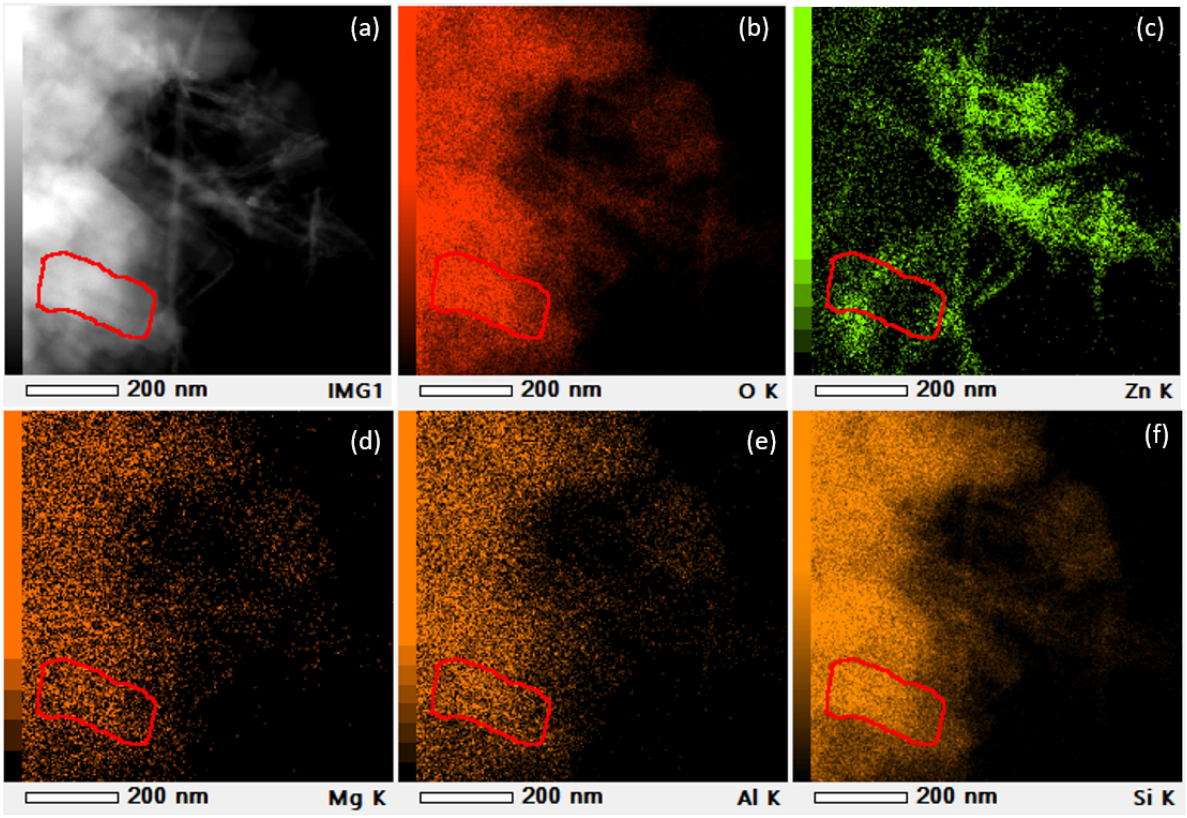

Figure S6 Local elemental mapping of Mg/ZnZSM-5 by STEM-EDS: (a)STEM image, (b) - (f) Spatial mapping of each element.

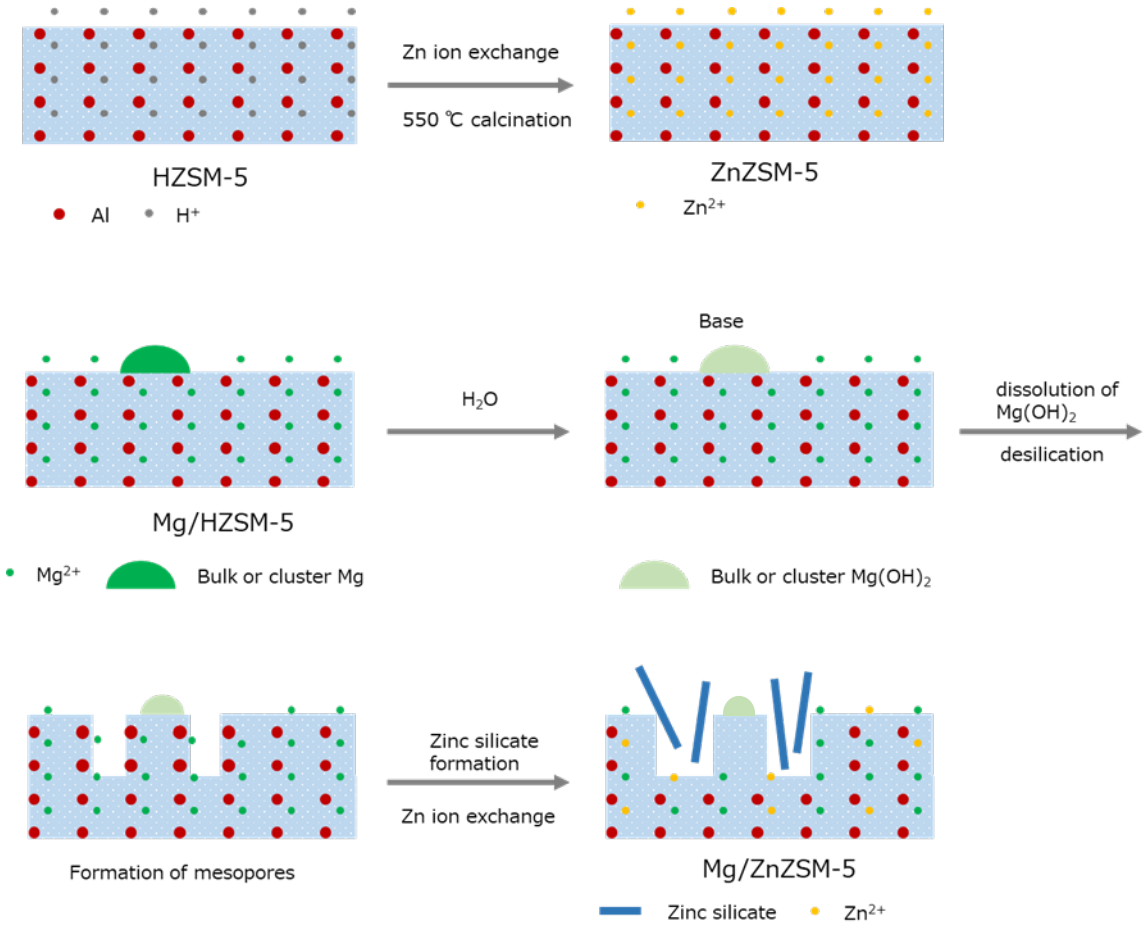

Figure S7 The possible morphology changes in ZnZSM-5 and Mg/ZnZSM-5.

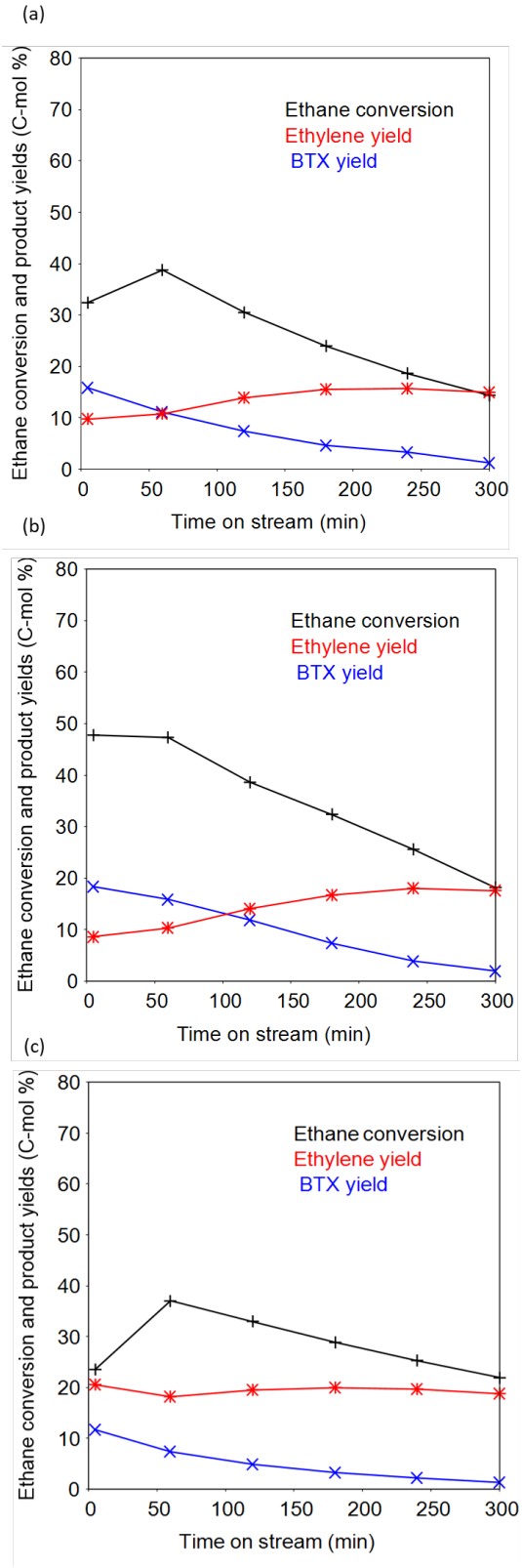

Figure S8 The time course of the conversion of ethane and the product yields over Mg/ZnZSM-5 with different loading amount of Mg (a) 3wt, (b) 5wt and (c) 10wt.

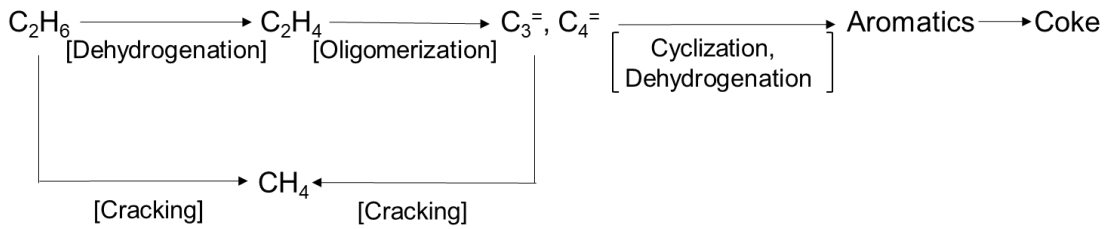

Figure S9 The possible reaction scheme of dehydroaromatization of ethane.

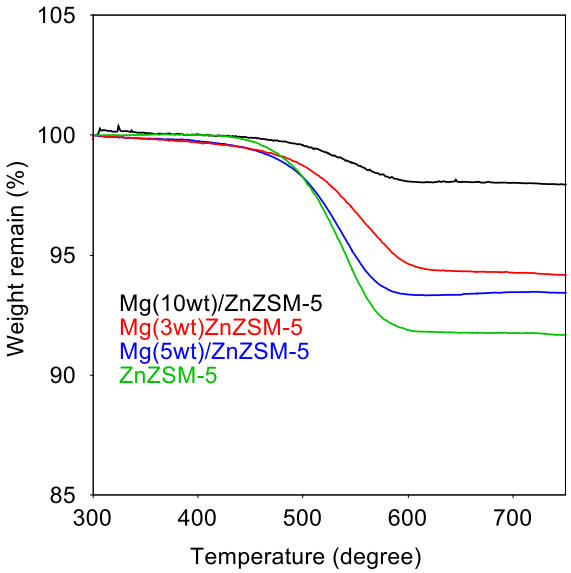

Figure S10 TG curves of spent Mg/ZnZSM-5 with different loading amount of Mg and ZnZSM-5.

Table S1 Composition of Mg/ZnZSM-5 with different loading amount of Mg.

sample	Molar ratios		
	Si/Al	Zn/Al	Mg/Al
Mg(3wt)/ZnZSM-5	9.40	0.39	0.53
Mg(5wt)/ZnZSM-5	8.73	1.19	0.56
Mg(10wt)/ZnZSM-5	8.30	0.93	1.79

Table S2 Partial composition of Mg/ZnZSM-5 (Figure S4).

element	Weight (%)	Atom (%)
O	37.91	58.63
Mg	0.30	0.31
Al	0.54	0.49
Si	25.67	22.61
Zn	32.11	12.15

Table S3 Partial composition of Mg/ZnZSM-5 (FigureS5).

element	Weight (%)	Atom (%)
O	48.46	62.35
Mg	1.69	1.43
Al	1.82	1.39
Si	44.92	32.92
Zn	2.37	0.75

Table S4 Initial product yields (TOS: 5 min) of HZSM-5, ZnZSM-5, Mg/HZSM-5 and Mg/ZnZSM-5.

Yields (C-mol %)	catalyst			
	HZSM-5	ZnZSM-5	Mg/HZSM-5	Mg/ZnZSM-5
C_2=	7.01	5.20	2.59	8.66
C_3=	0.75	0.35	0.42	0.43
C_4=	0.085	0.95	0.16	0.18
C_1-C_4 alkane	1.55	16.57	0.10	15.48
C_5> *	0.065	0.10	0.004	0.027
Benzene	0.11	7.78	0	9.47
Toluene	0.097	5.89	0	7.35
Xylene	0	1.30	0	1.55
Other Aroma	0	0.88	0	0.33

*Aromatics are not included in yield of C_5>.