

Fig. 1

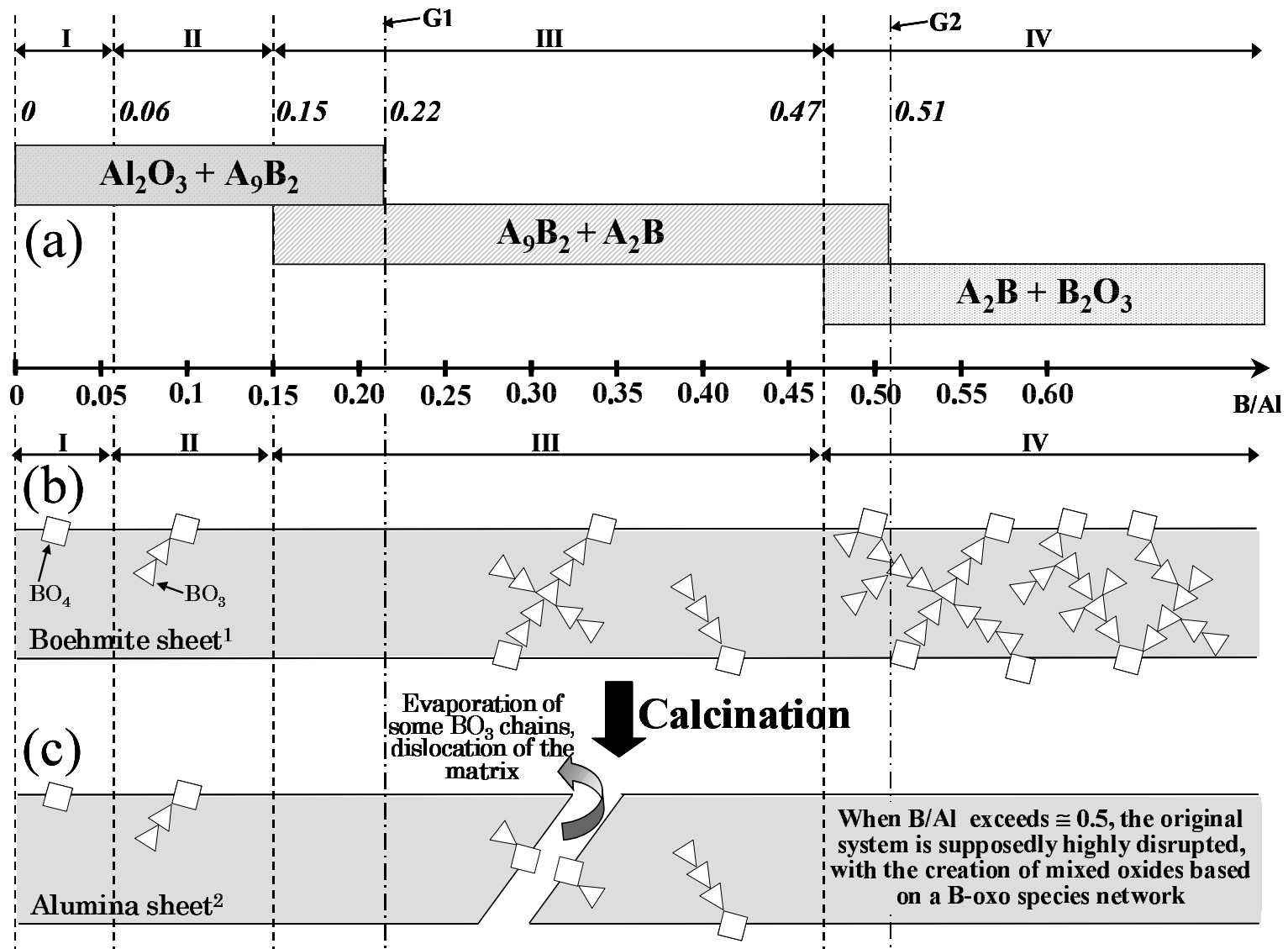


Fig. 2

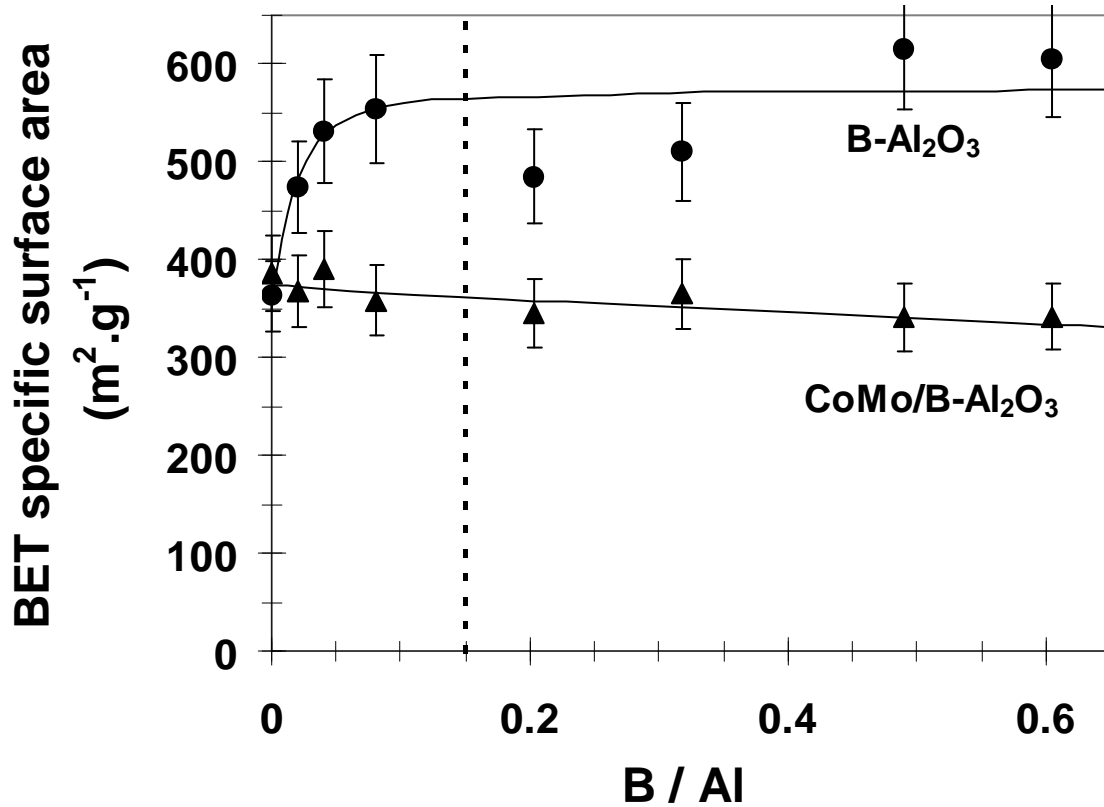


Fig. 3

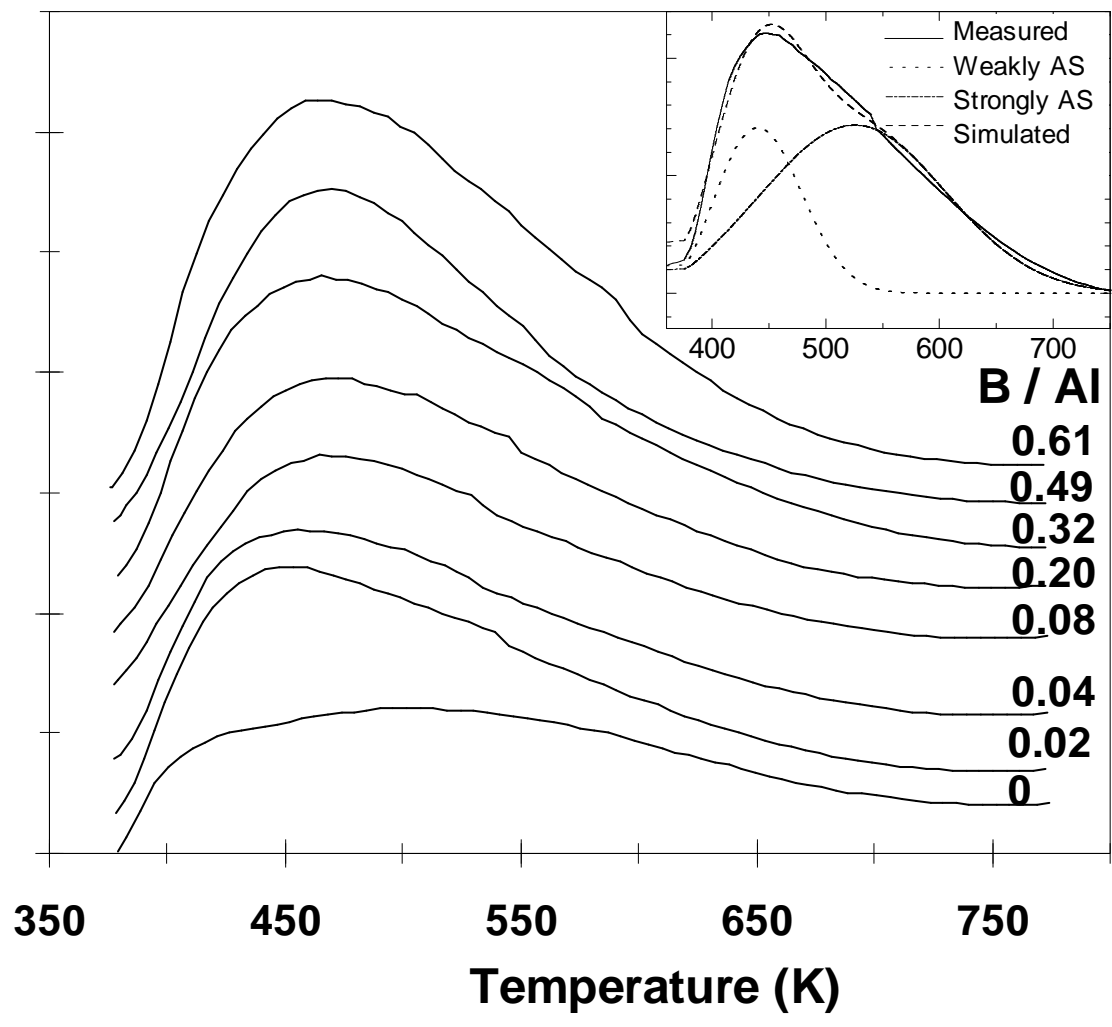


Fig. 4

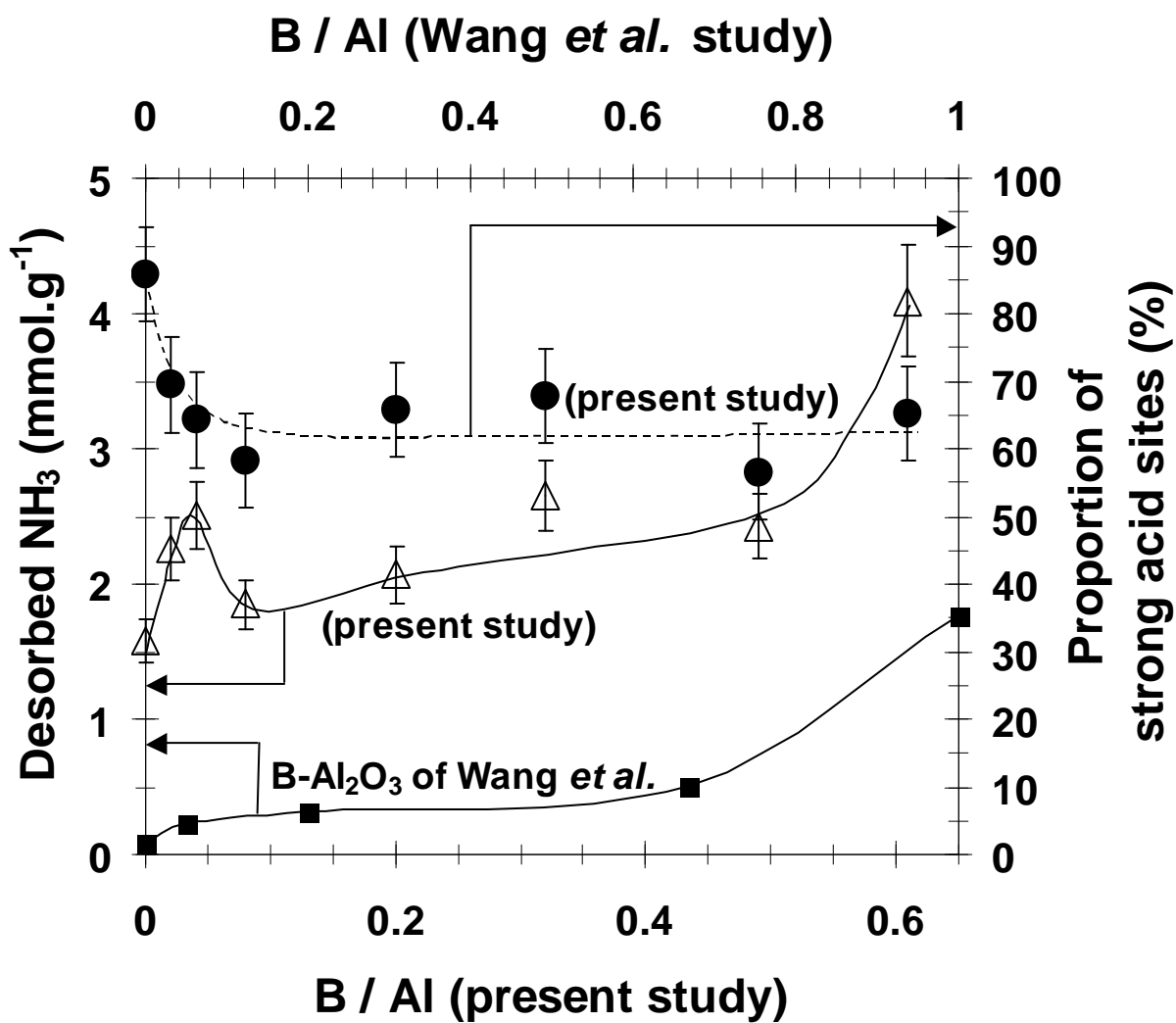


Fig. 5

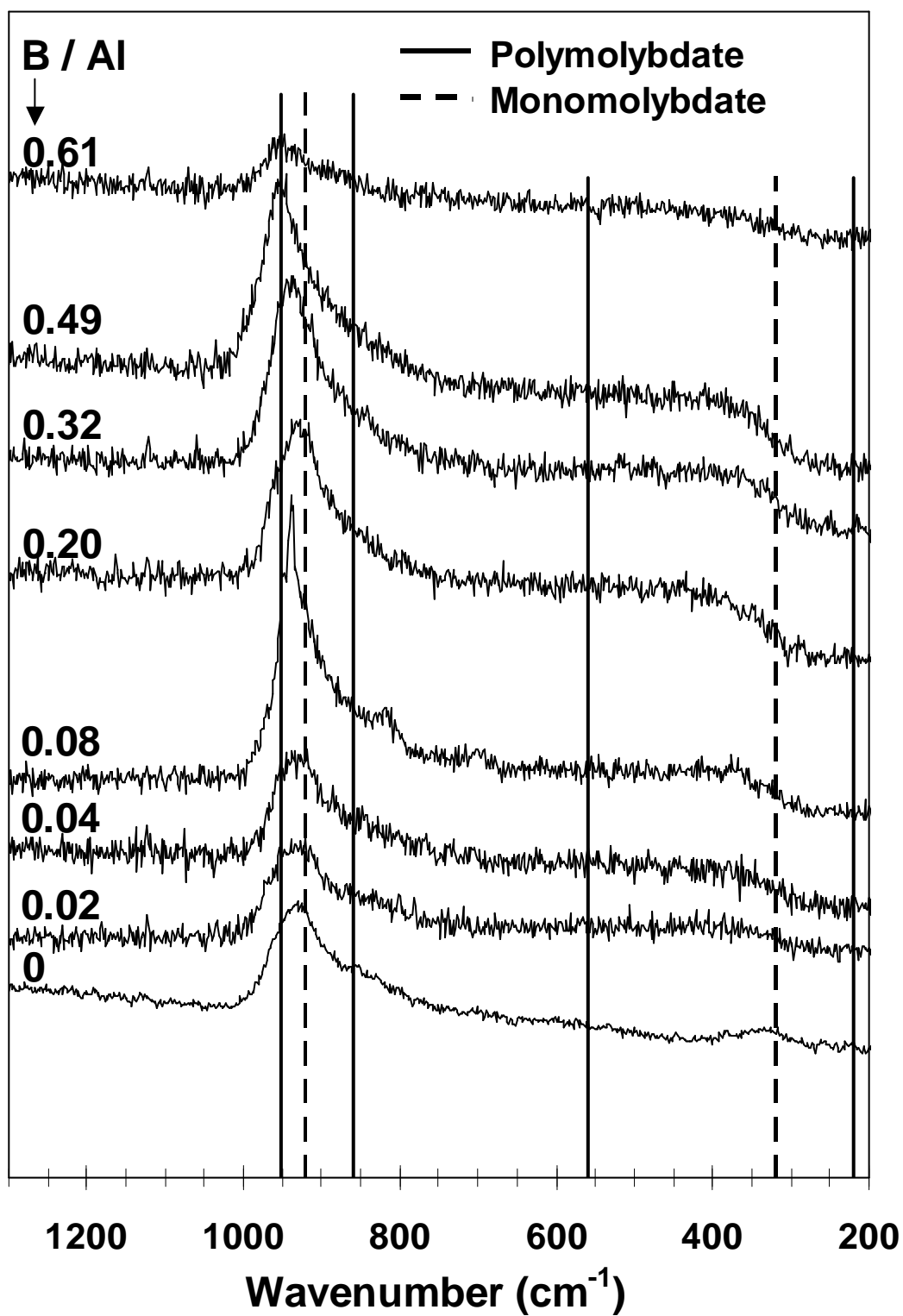


Fig. 6

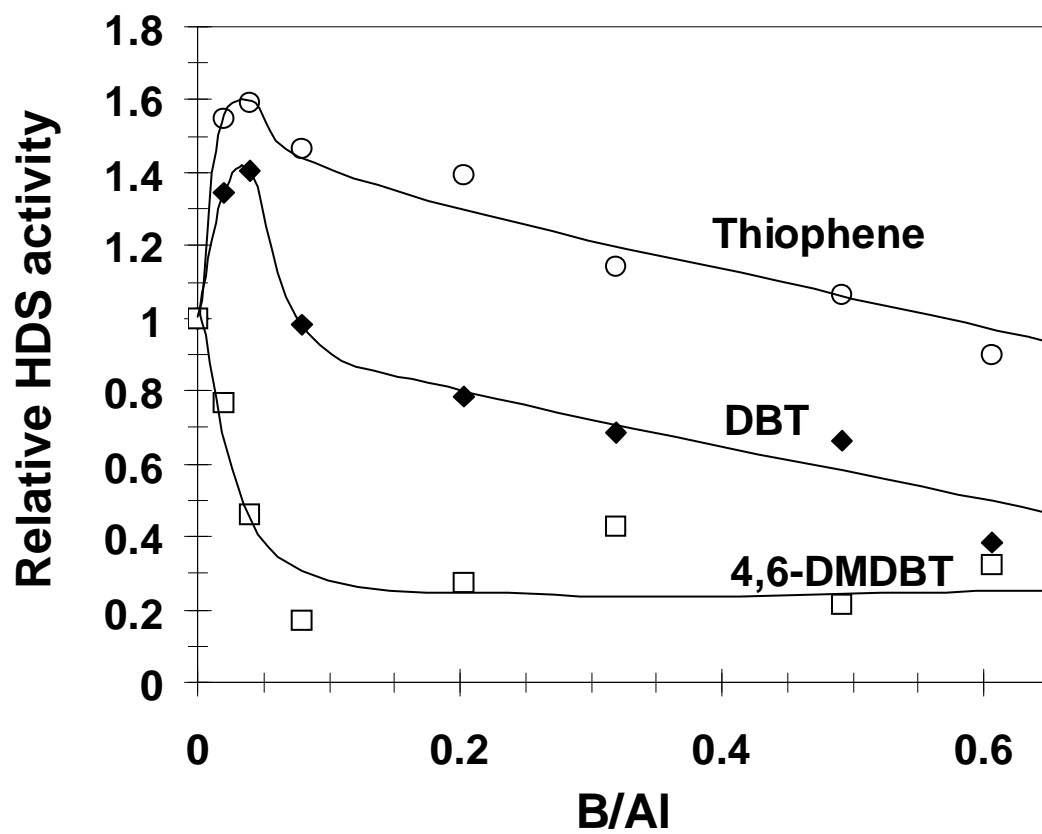


Fig. 7

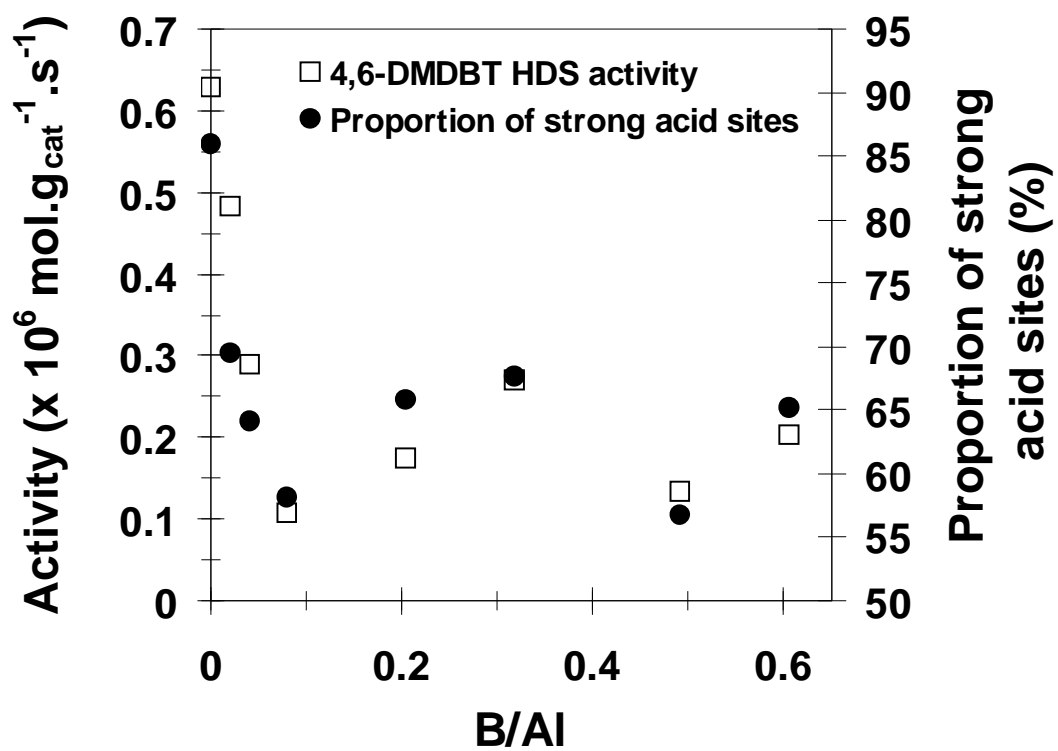


Fig. 8

Table 1 Textural and acidic properties of the sol-gel prepared B-Al₂O₃ supports

B/Al*	BET Specific Surface Area (SSA; m ² .g ⁻¹)	Water Pore Volume (PV; cm ³ .g ⁻¹)	BJH Pore Volume (PV; cm ³ .g ⁻¹)	Average Pore Diameter** (APD; nm)	Total Acidity*** (mmol.g ⁻¹)	Proportion of strong acid sites**** (%)
0	363	1.9	0.84	9.3	1.58	85.9
0.02	474	1.95	0.78	6.4	2.26	69.5
0.04	532	1.9	0.82	6.1	2.51	64.2
0.08	554	1.75	0.8	5.6	1.85	58.2
0.20	485	1.55	0.59	4.6	2.07	65.8
0.32	510	1.55	0.66	4.9	2.65	67.7
0.49	616	1.35	0.87	5.2	2.42	56.7
0.61	606	2.6	1.22	6.8	4.09	65.2

* Corrected for nominal B/Al ratios larger than 0.15 (see Ref. [36] and section 2.1 in the text).

** Calculated using the BET SSA and BJH PV.

*** Total amount of adsorbed NH₃ on each catalyst.

**** Ratio of strong acidity relative to the total acidity. Strong acidity was defined as the area of the high temperature peak at about 523 K.

Table 2 Physical properties of the CoMo/B-Al₂O₃ oxidic precursors

Corrected B/Al*	BET Specific Surface Area (SSA)		BJH Pore Volume (PV)		Average Pore Diameter (APD**)	
	(m ² .g ⁻¹)	Ratio*** (-)	(cm ³ .g ⁻¹)	Ratio*** (-)	(nm)	Ratio*** (-)
0	387	1.1	0.63	0.71	6.5	0.70
0.02	368	0.78	0.59	0.76	6.4	1.00
0.04	391	0.47	0.54	0.41	5.5	0.90
0.08	358	0.65	0.46	0.58	5.1	0.91
0.20	345	0.71	0.44	0.75	5.1	1.11
0.32	365	0.72	0.49	0.74	5.4	1.10
0.49	341	0.56	0.51	0.60	6.0	1.15
0.61	342	0.56	0.77	0.63	9.0	1.32
IRC****	271	-	-	-	7.6	-

* See the first footnote of Table 1.

** Calculated using the BET SSA and BJH PV.

*** Ratio relative to that of the corresponding B-Al₂O₃ support.

**** Industrial reference catalyst.

Table 3 Catalytic activities in HDS of thiophene

Corrected B/Al*	HDS Rate (x 10 ⁸ mol.gcat.s ⁻¹)	Cis-but-2-ene (%)	Product Distribution	
			But-1-ene + Trans-but-2-ene (%)	Butane (%)
0	120	40.3	18	41.7
0.02	186	29.9	27.6	42.5
0.04	191	34.7	31.7	33.6
0.08	176	31.9	29.6	38.5
0.20	167	34.7	31.7	33.6
0.32	137	39.2	33.5	27.3
0.49	128	44.8	34.9	20.3
0.61	108	41.4	37.5	21.1
IRC	135	39.7	21.8	38.5

* See the first footnote of Table 1.

Table 4 Catalytic activities in HDS reactions of DBT

Corrected B/Al*	HDS Rate (x 10 ⁶ mol.gcat ⁻¹ .s ⁻¹)	Product Distribution			
		Biphenyl (%)	Cyclohexylbenzene (%)	4H-DBT** (%)	6H-DBT*** (%)
0	4.30	90.6	7.4	1.8	0.2
0.02	5.79	92.9	6.1	1	< 0.2
0.04	6.05	93.1	5.8	1.1	< 0.2
0.08	4.22	94.1	4.5	1.4	< 0.2
0.20	3.37	94.1	4	1.9	< 0.2
0.32	2.94	92.4	4.8	2.8	< 0.2
0.49	2.85	90.2	6.1	3.7	< 0.2
0.61	1.66	89.7	6.2	4.1	< 0.2
IRC	3.57	76.2	22.5	1.1	0.2

* See the first footnote of Table 1.

** 4H-DBT: tetrahydrodibenzothiophene.

*** 6H-DBT: hexahydrodibenzothiophene.

Table 5 Catalytic activities in HDS reactions of 4,6-DMDBT

Corrected B/Al*	HDS Rate		Product Distribution			
	(x 10 ⁶ mol.gcat ⁻¹ .s ⁻¹)	3,3'-DMCHB** (%)	3,3'-DMBP*** (%)	4H-4,6- DMDBT**** (%)	Cracking Products (%)	Ratio Toluene / MCH
0	0.628	86.3	5.8	0.7	7.2	1.08
0.02	0.483	84	9.4	1.3	5.3	1.11
0.04	0.288	82.3	8.9	1.9	6.9	1.16
0.08	0.108	50.1	2.4	2.9	44.5	1.21
0.20	0.174	58.2	8.4	3.9	29.6	1.34
0.32	0.269	56.8	7.0	4.7	31.5	1.46
0.49	0.133	51.8	5.8	3.9	38.6	1.53
0.61	0.204	57.9	7.3	1.9	32.9	1.47
IRC	0.831	88.4	11.3	0.3	0	-

* See the first footnote of Table 1.

** 3,3'-Dimethylcyclohexylbenzene. Including trace amounts of 3,3'-Dimethylbicyclohexyl (3,3'-DMBCH).

*** 3,3'-Dimethylbiphenyl.

**** Tetrahydro-4,6-dimethyldibenzothiophene. Including trace amounts of hexahydro-4,6-dimethyldibenzothiophene (6H-4,6-DMDBT) (less than an absolute value of ~ 0.2 %).