

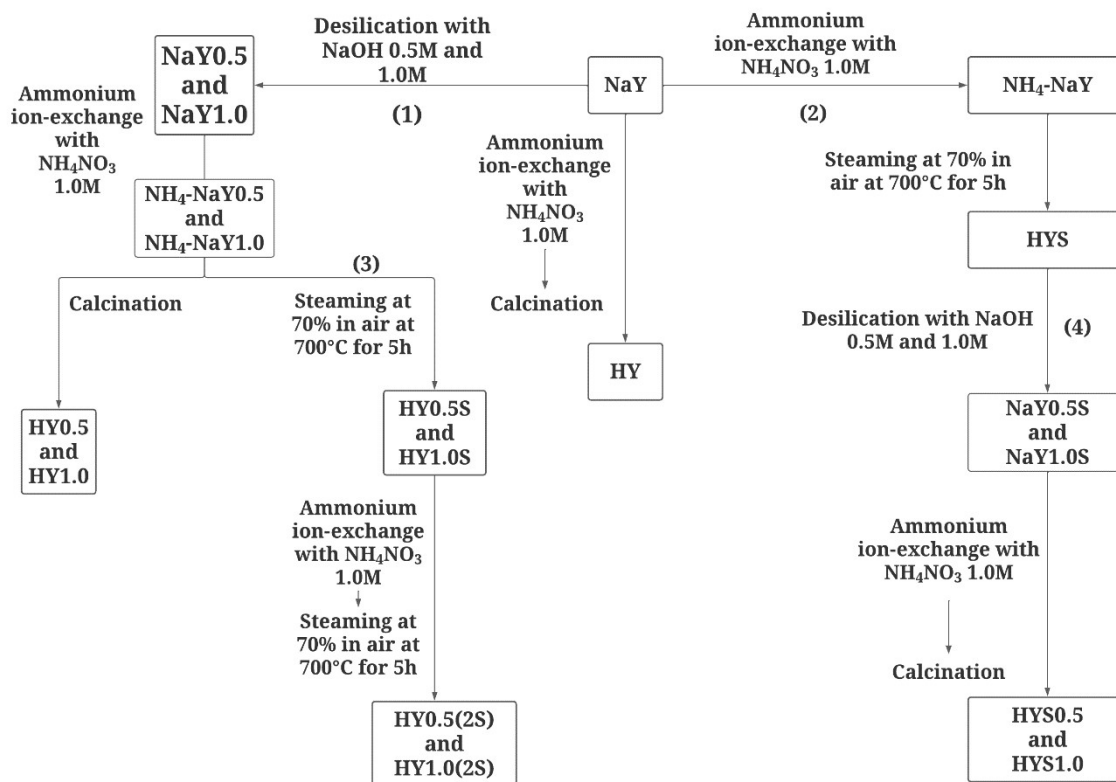
Supplementary information

**Hierarchical submicrosized Y zeolites prepared by sequential desilication-dealumination post-synthesis modification and their catalytic performance in vacuum gas oil hydrocracking**

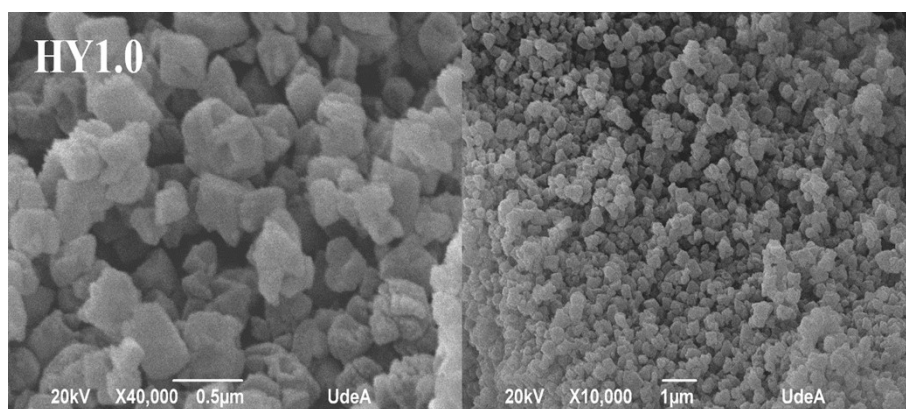
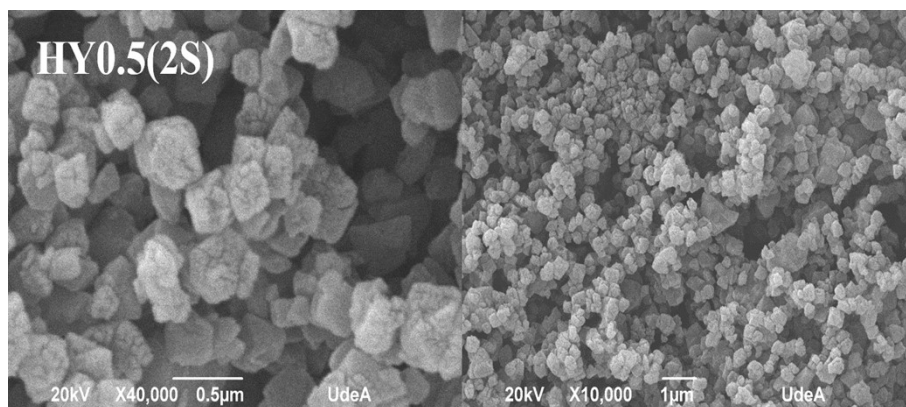
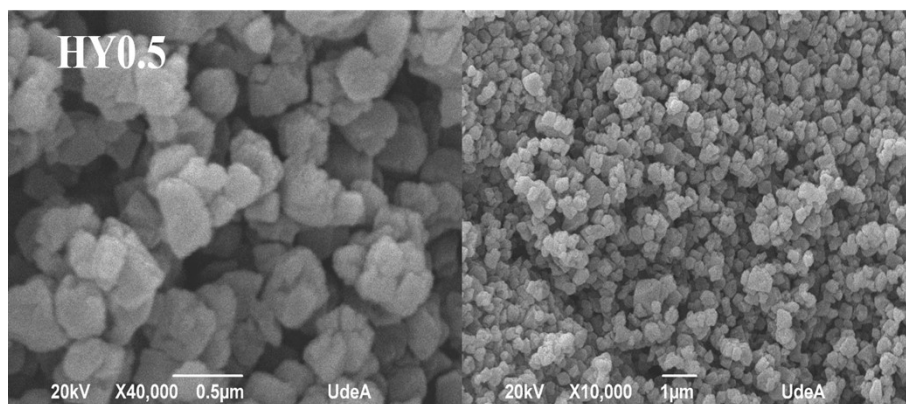
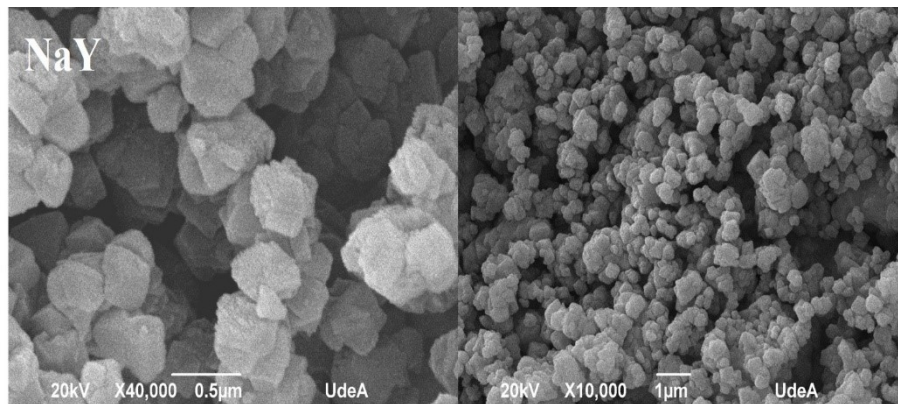
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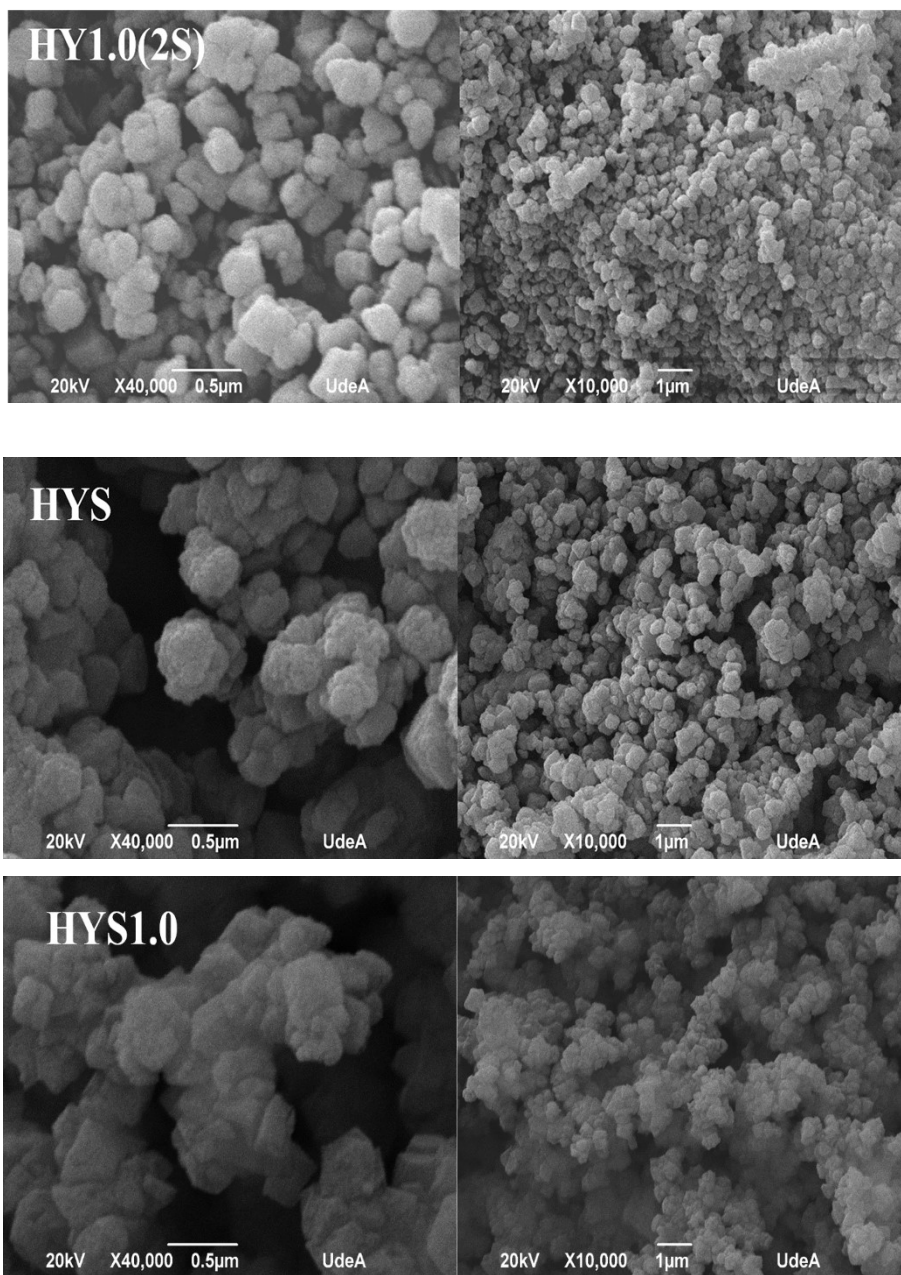
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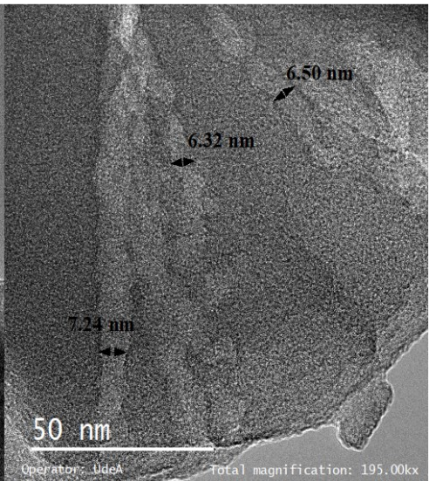
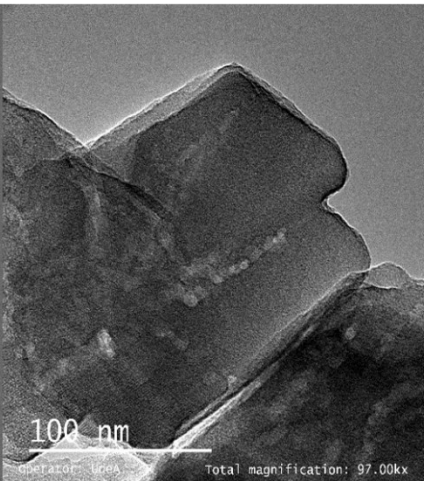
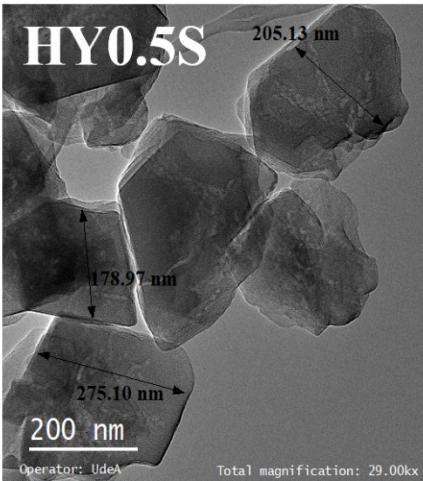
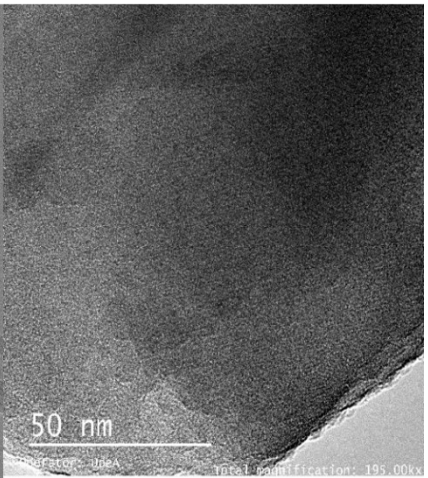
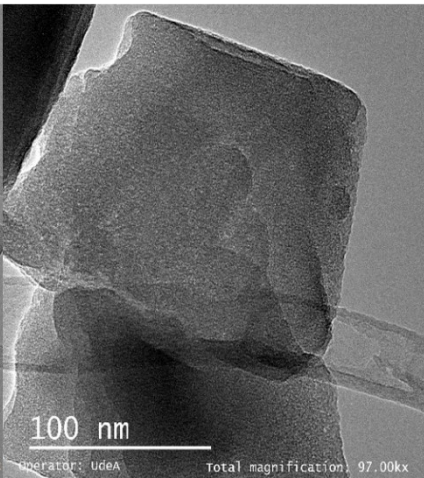
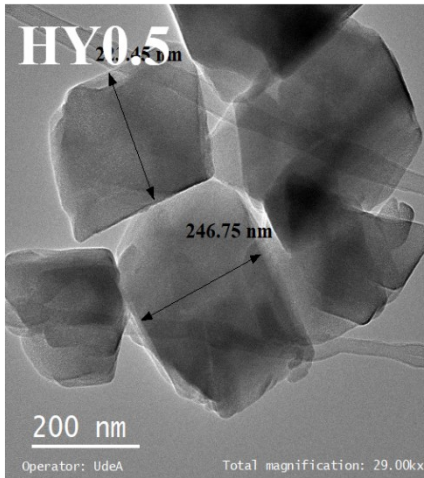
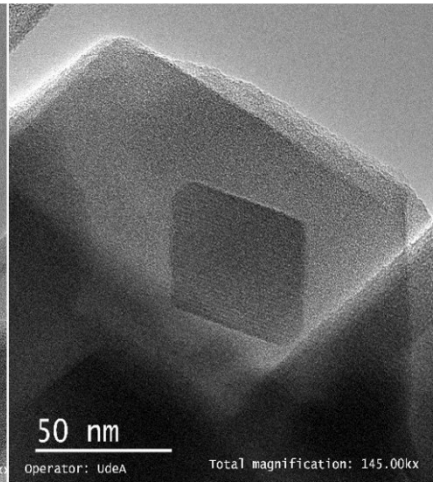
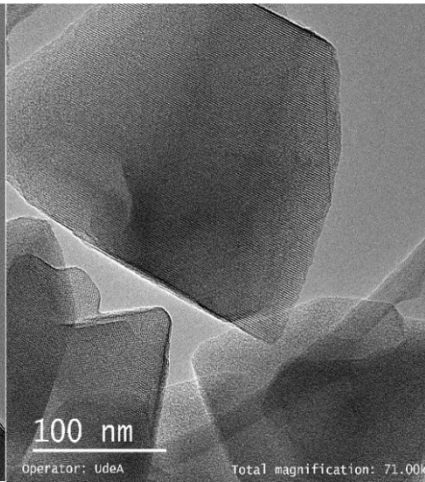
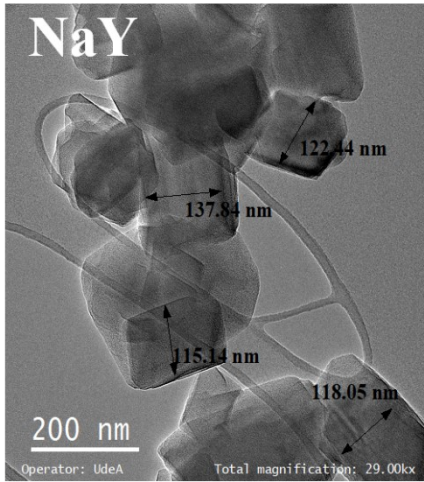


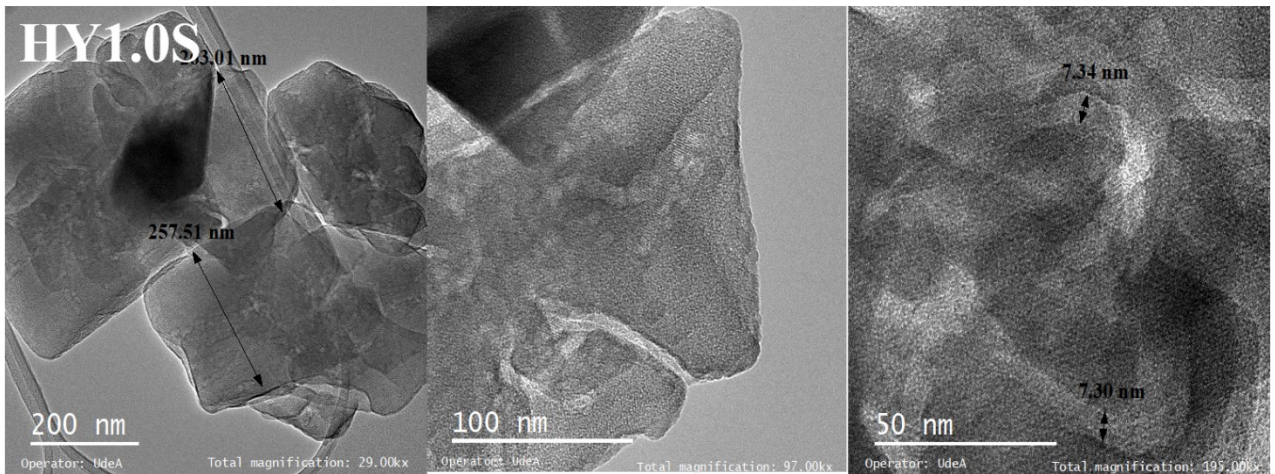
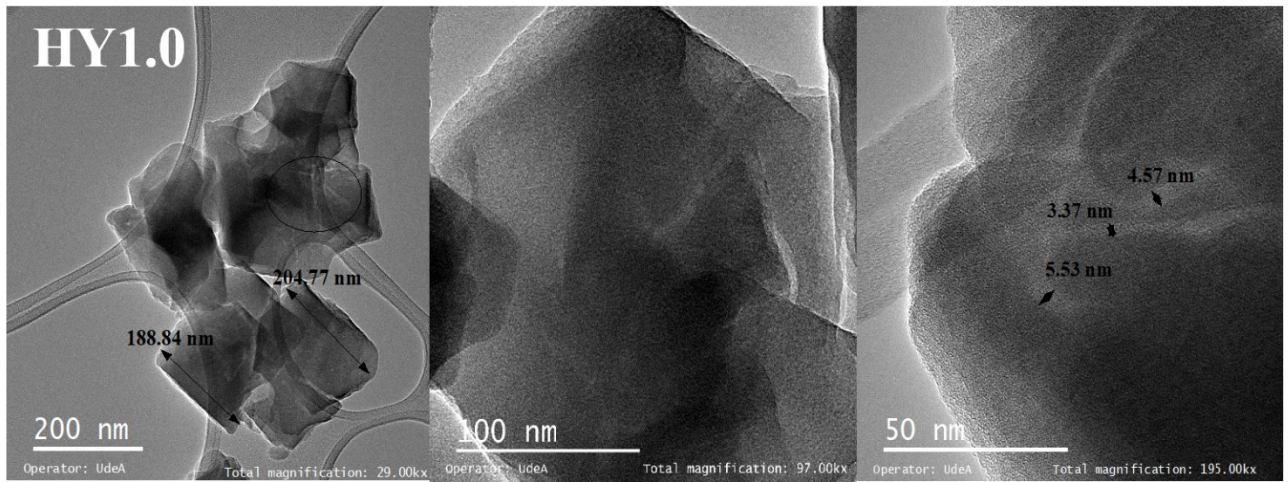
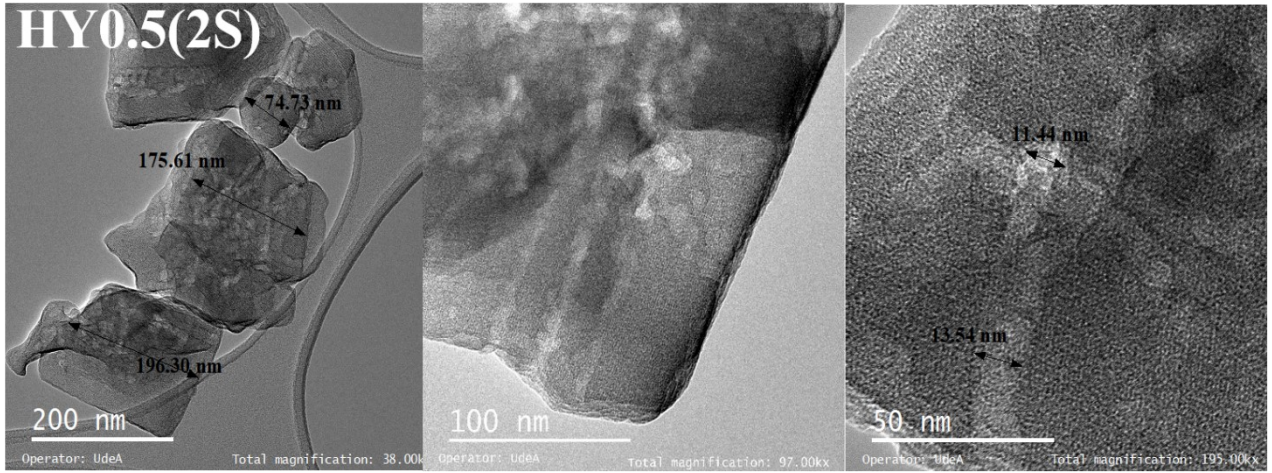
**Scheme 1S.** post-synthesis modifications of nanozeolite NaY.

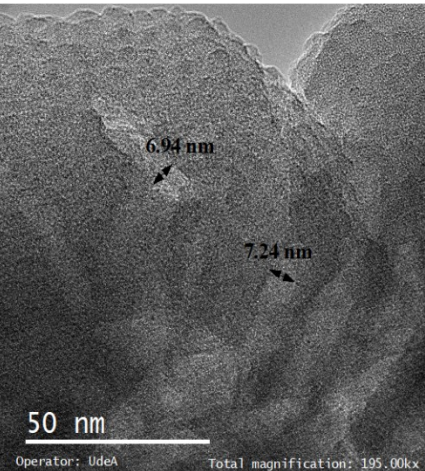
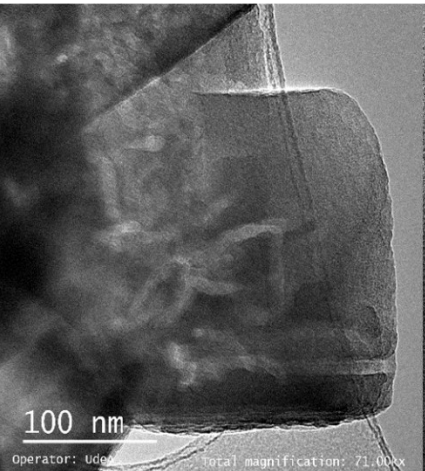
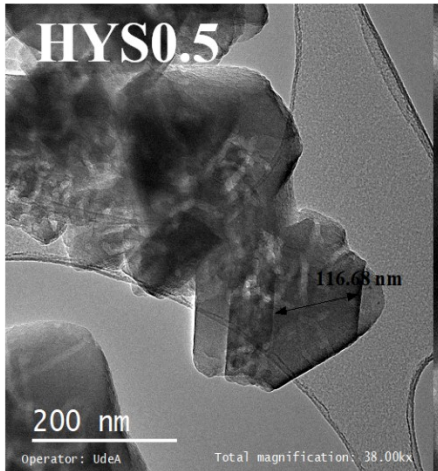
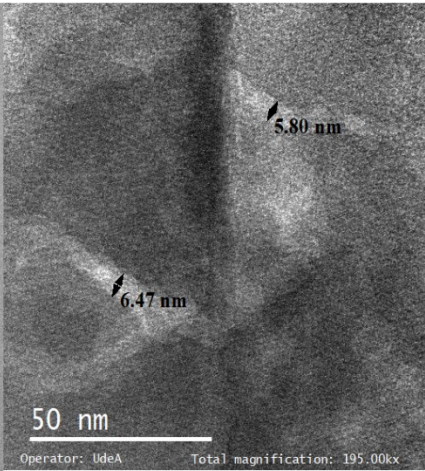
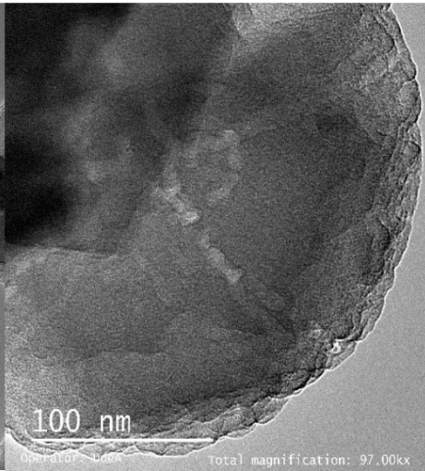
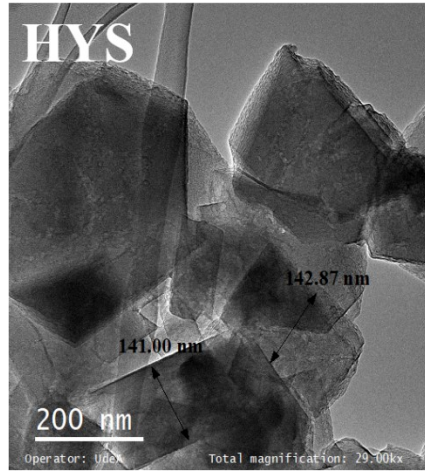
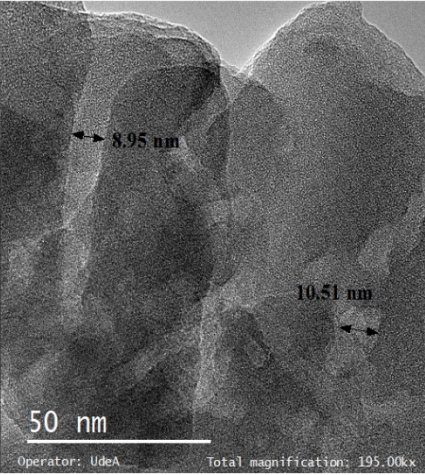
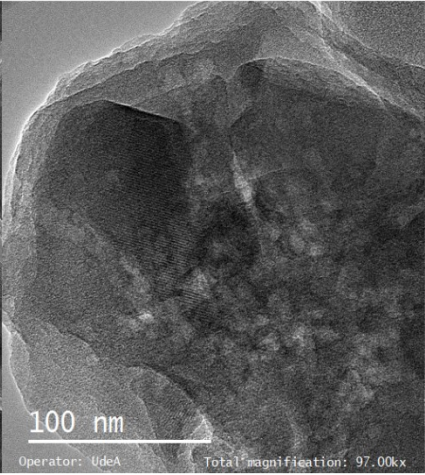
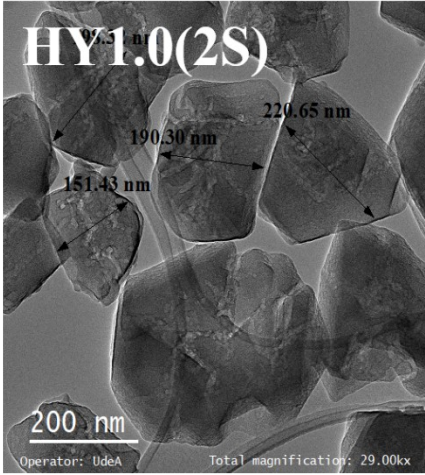


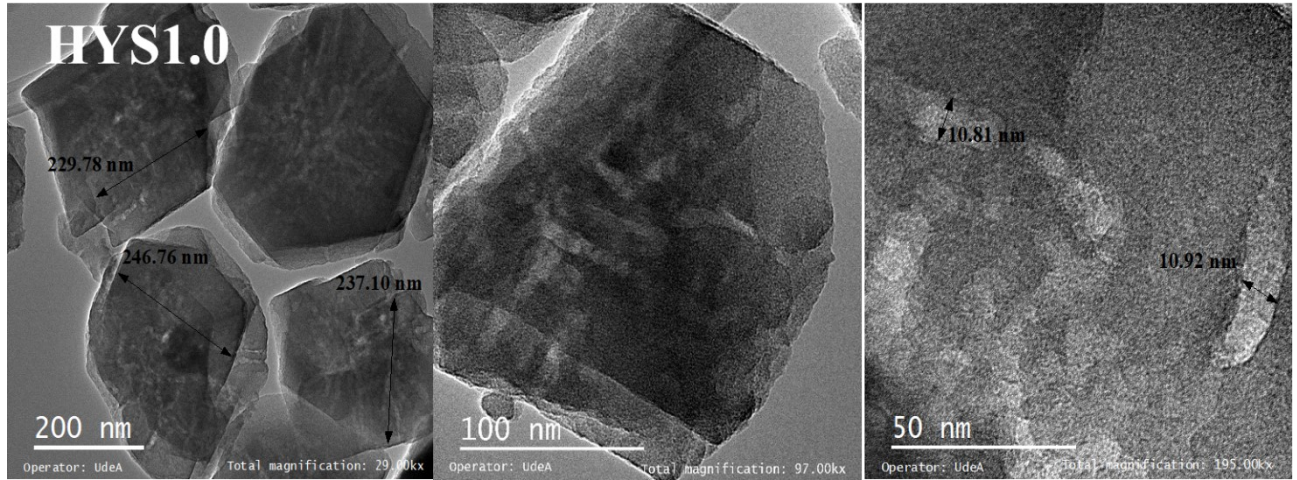


**Figure 1S.** SEM images of parent and modified zeolites









**Figure 2S.** TEM images of parent and modified zeolites



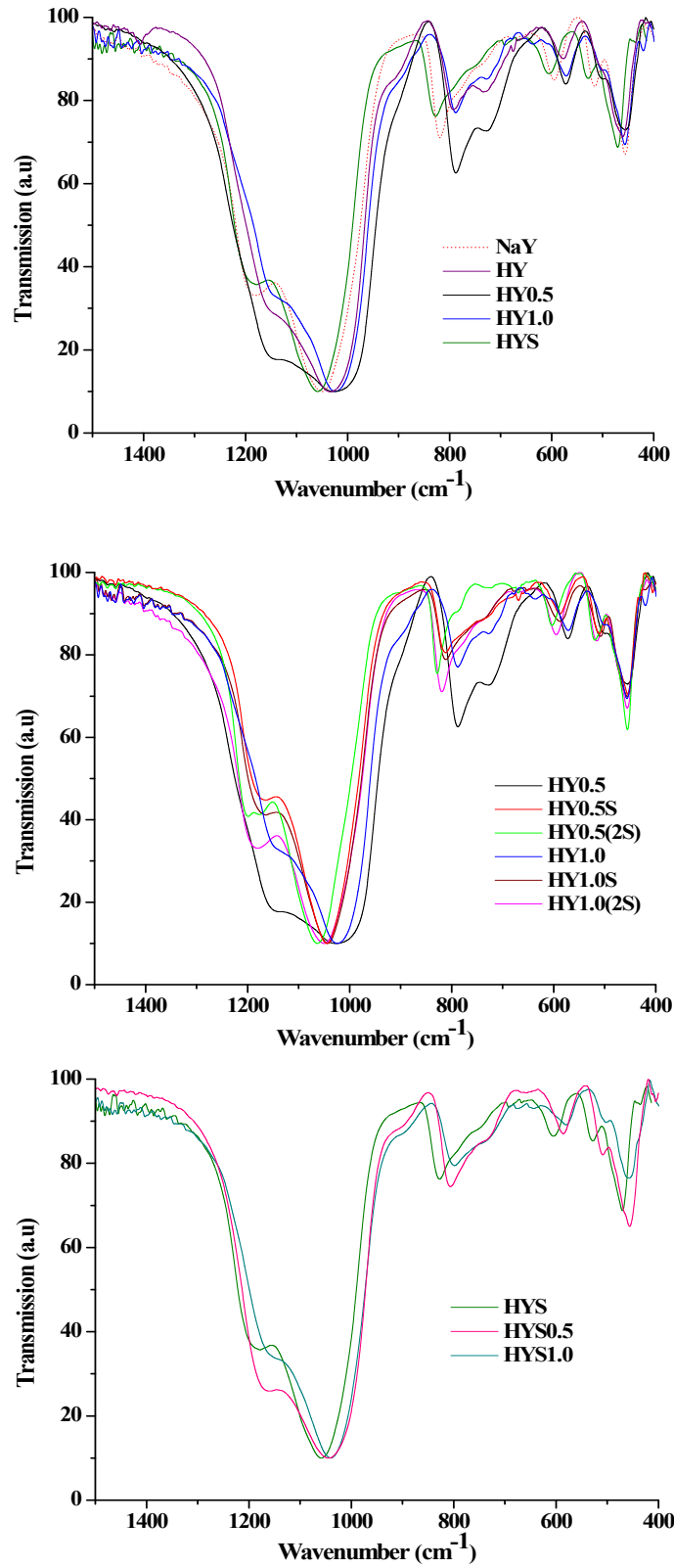
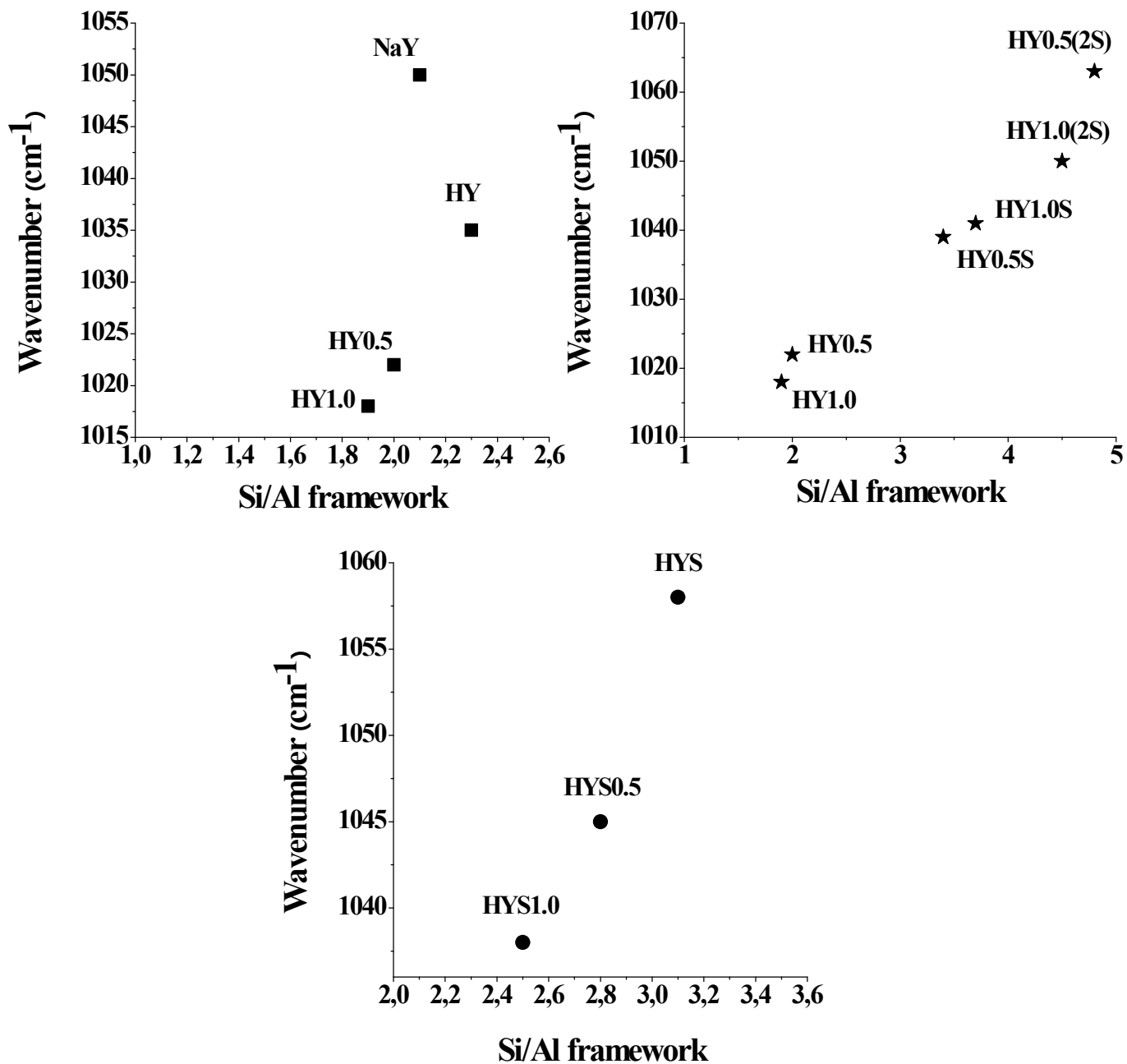


Figure 3S. FT-IR spectra of NaY and modified zeolites.



**Figure 4S.** Position of absorption band of zeolites at  $\sim 1000 \text{ cm}^{-1}$  as a function of the Si/Al ratio framework

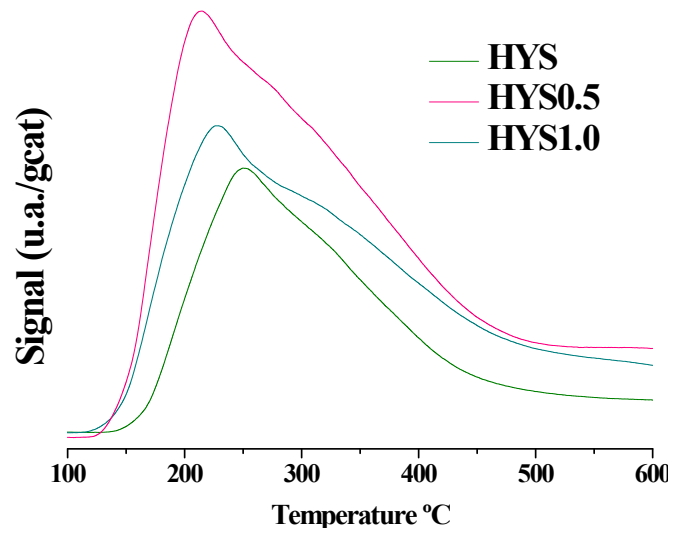
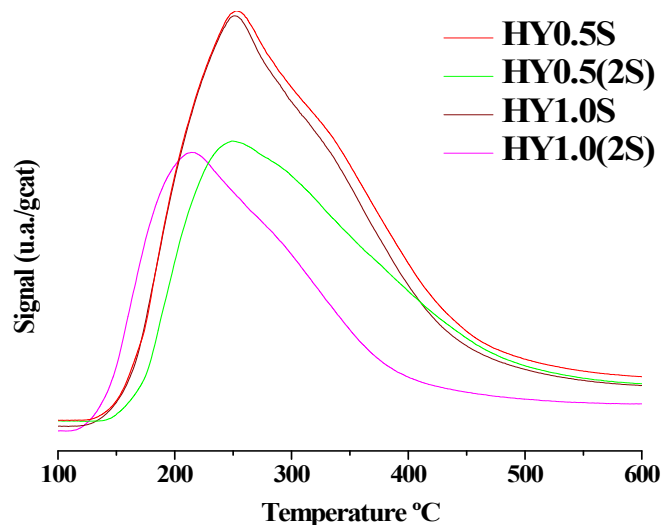
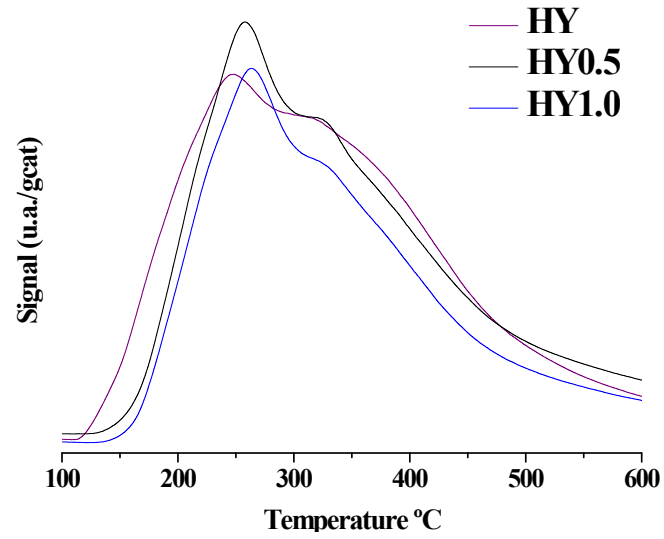
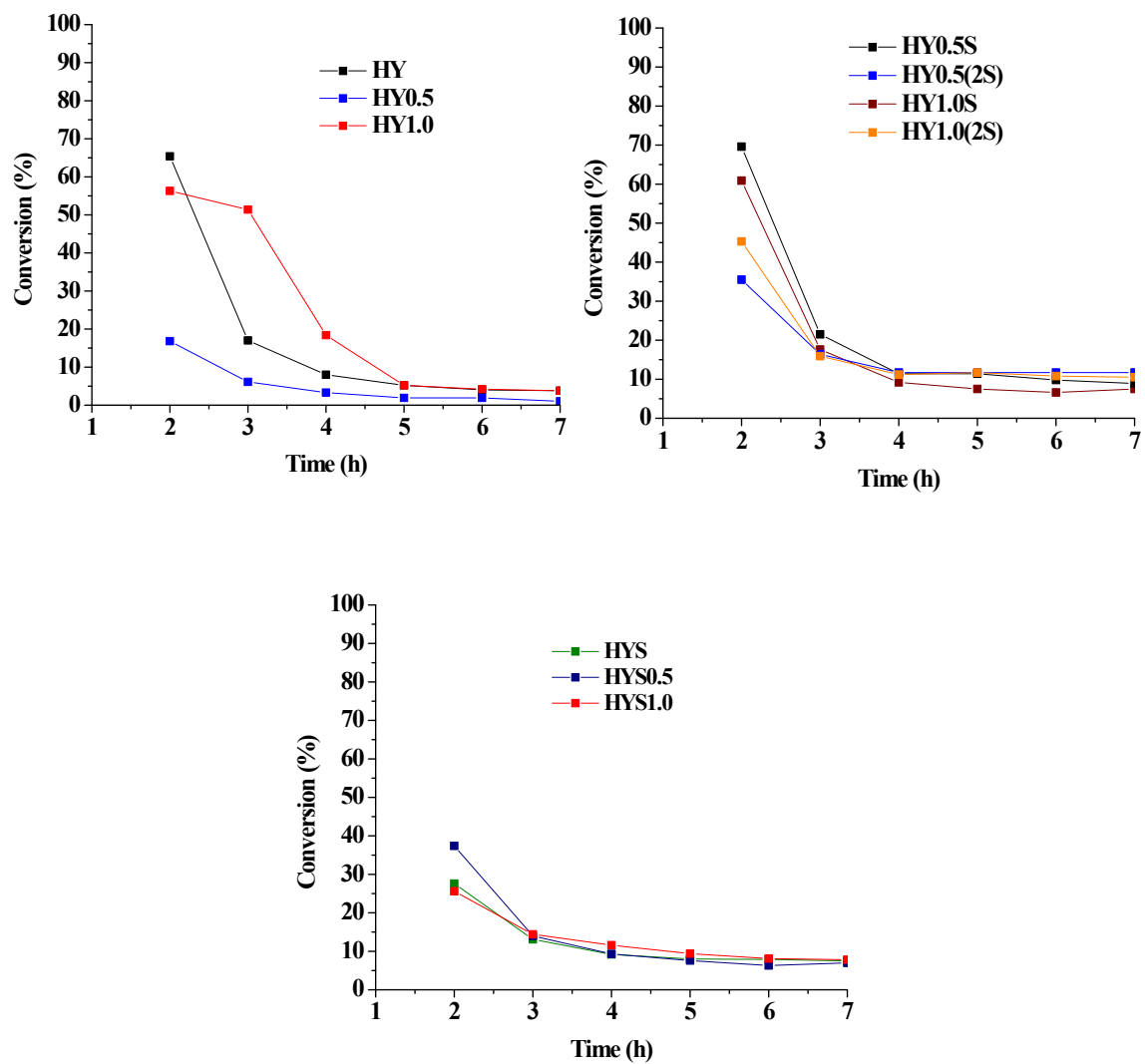
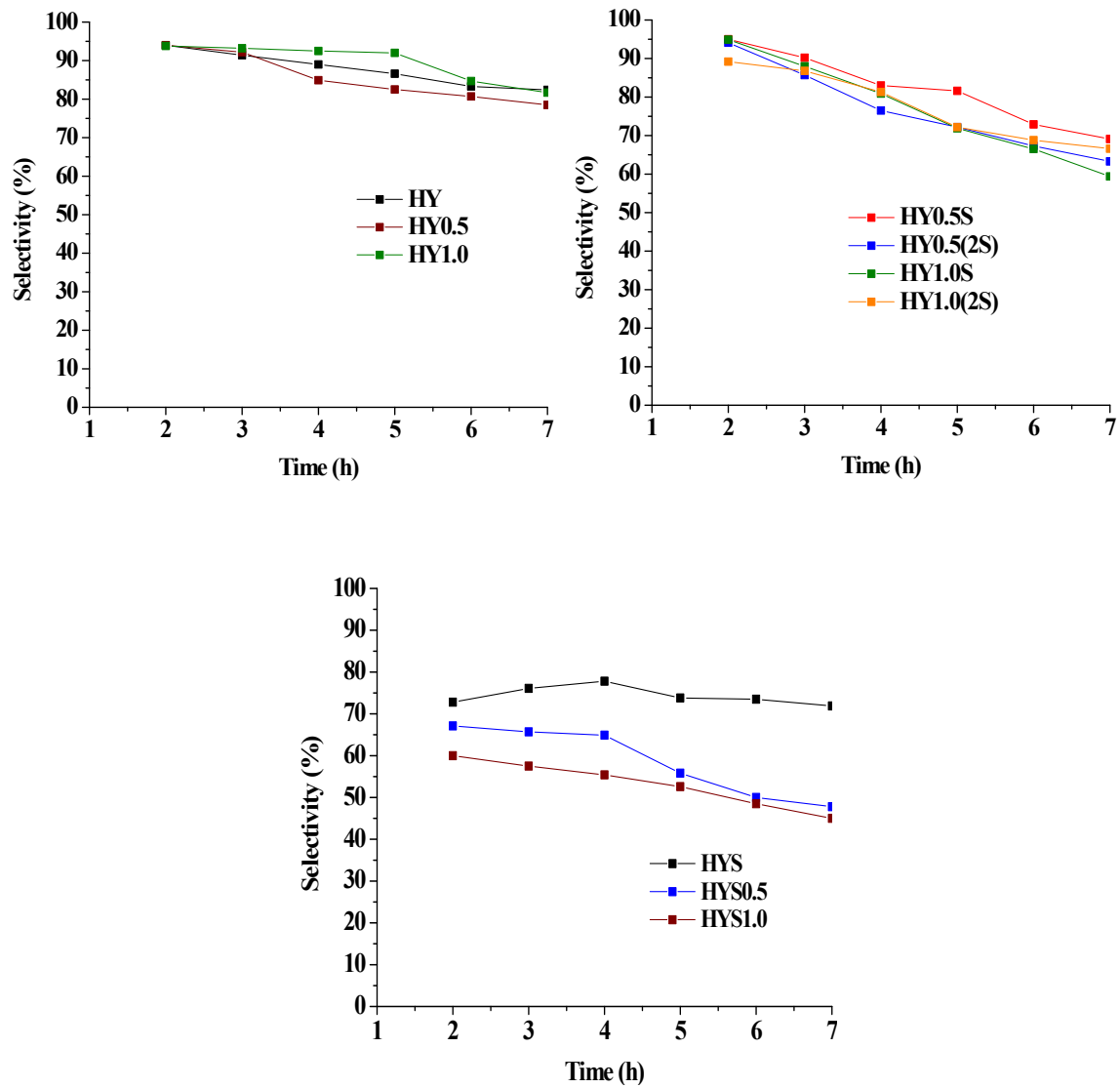


Figure 5S. Ammonia (NH<sub>3</sub>-TPD) profiles of Y zeolites



**Figure 6S.** Conversion of the catalysts in vacuum gas oil hydrocracking

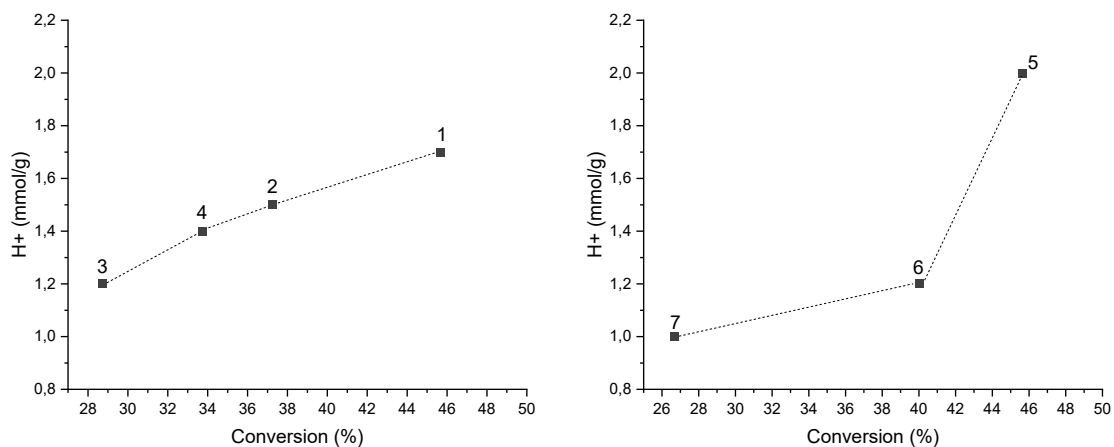


**Figure 7S.** Selectivity to middle distillate of the catalysts in vacuum gas oil hydrocracking

Table 1S: Average produced conversion, selectivity and yields in VGO hydrocracking after 370°C

Catalysts	Hydrocracking conversion (%)	Selectivity (%)	Yield (%)
		Middle distillate	
<b>HY</b>	12	81	10
<b>HY0.5</b>	10	69	7
<b>HY1.0</b>	9	74	7
<b>HY0.5S</b>	82	5	4
<b>HY0.5(2S)</b>	76	4	3
<b>HY1.0S</b>	77	3	2
<b>HY1.0(2S)</b>	76	6	5
<b>HYS</b>	74	8	5
<b>HYS0.5</b>	73	9	5
<b>HYS1.0</b>	63	6	3

Middle distillates: B.P. in the range 180–370°C.



**Figure 8S.** Correlation between Brønsted acid site concentration -  $H^+$  and conversion (%) (taken from Table 4 and Table 5). 1. HY0.5S; 2. HY0.5(2S); 3. HY1.0S; 4. HY1.0(2S); 5. HYS; 6. HYS0.5; 7. HYS1.0