Supporting information

Demonstration of the nanosize effect of carbon nanomaterials on the dehydrogenation temperature of ammonia borane

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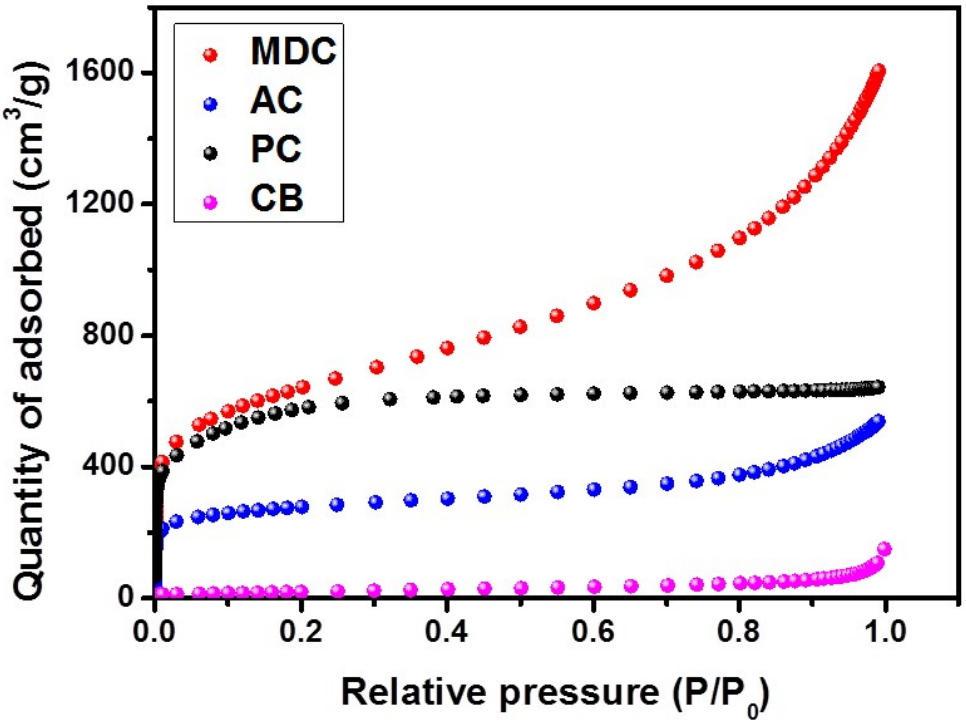
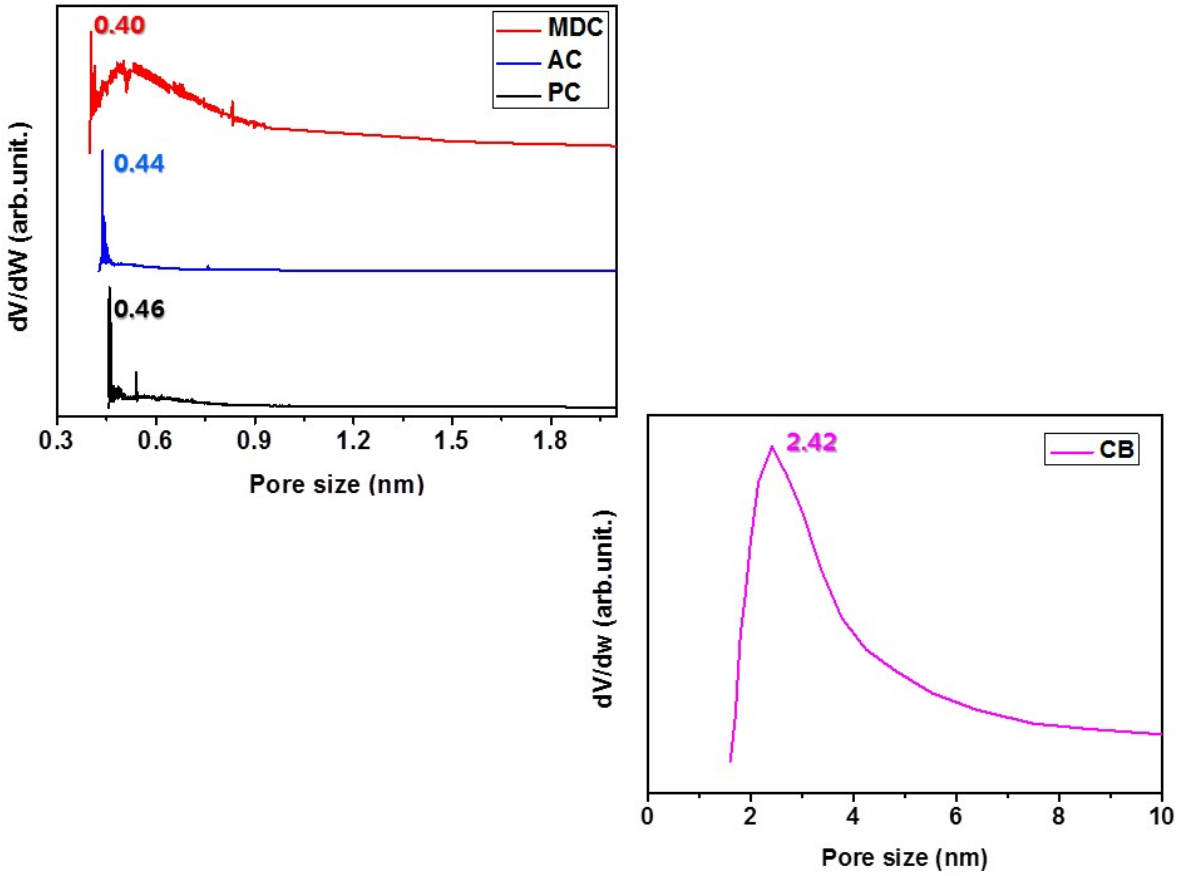
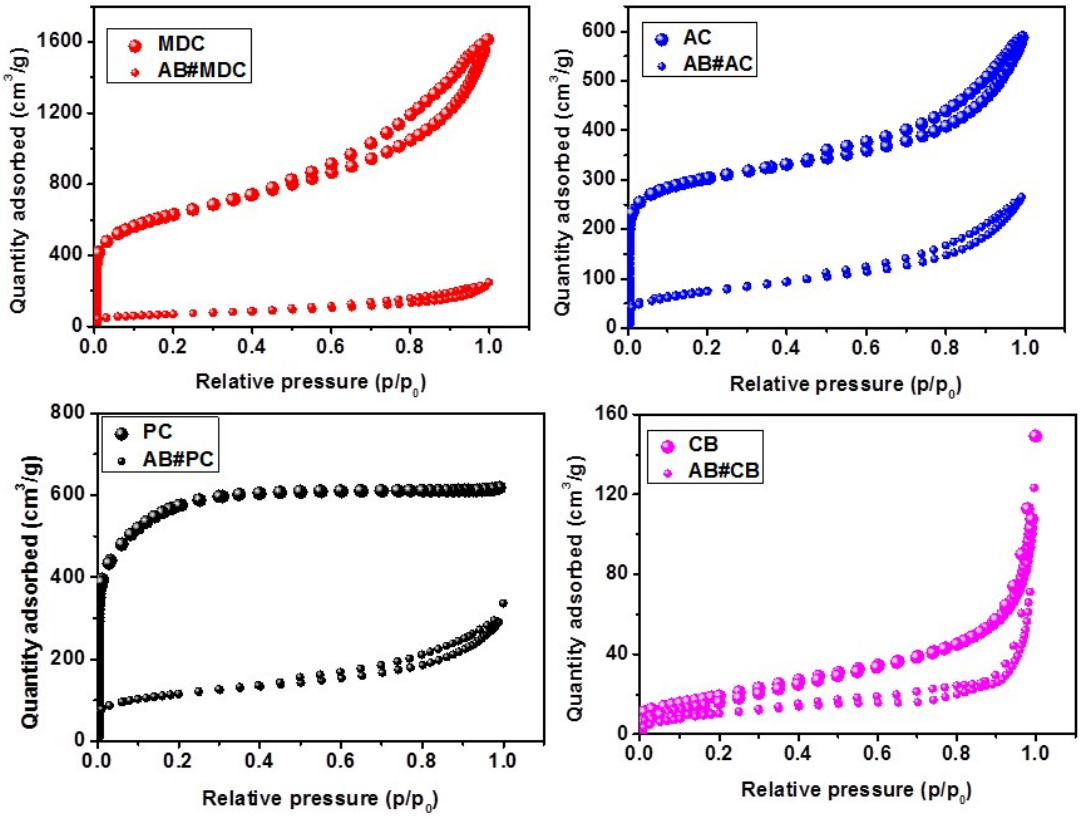


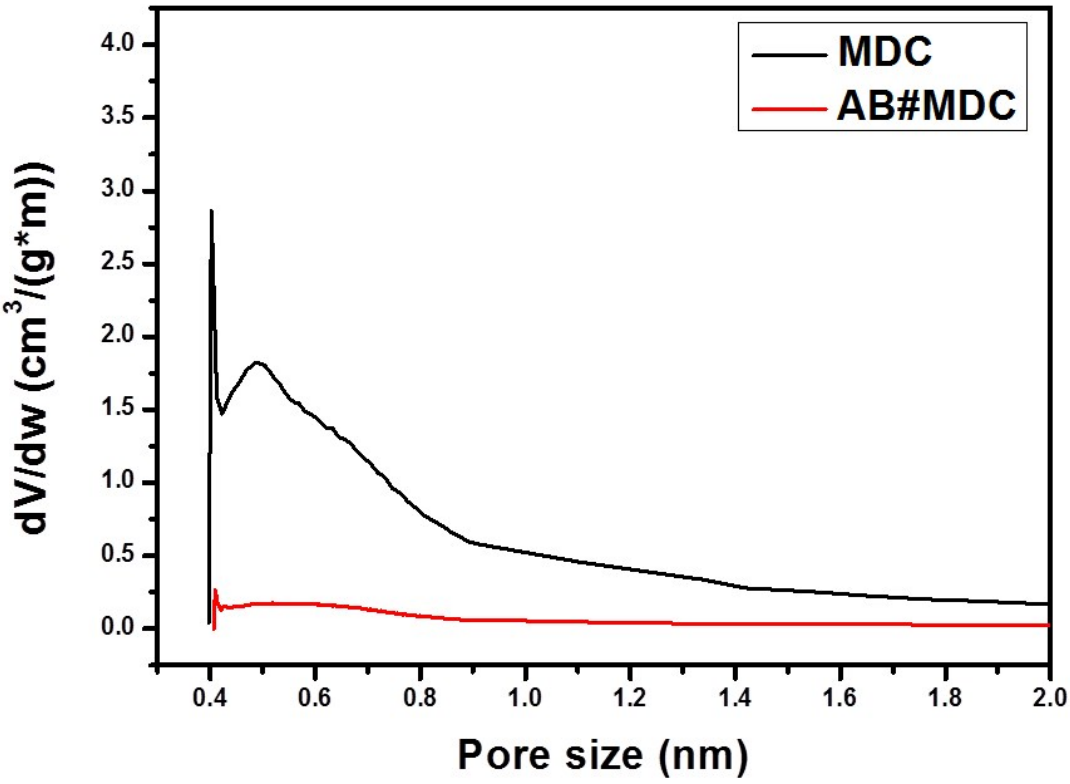
< Figure S1 > N_2 isotherm at 77 K of MDC, AC, PC, and CB



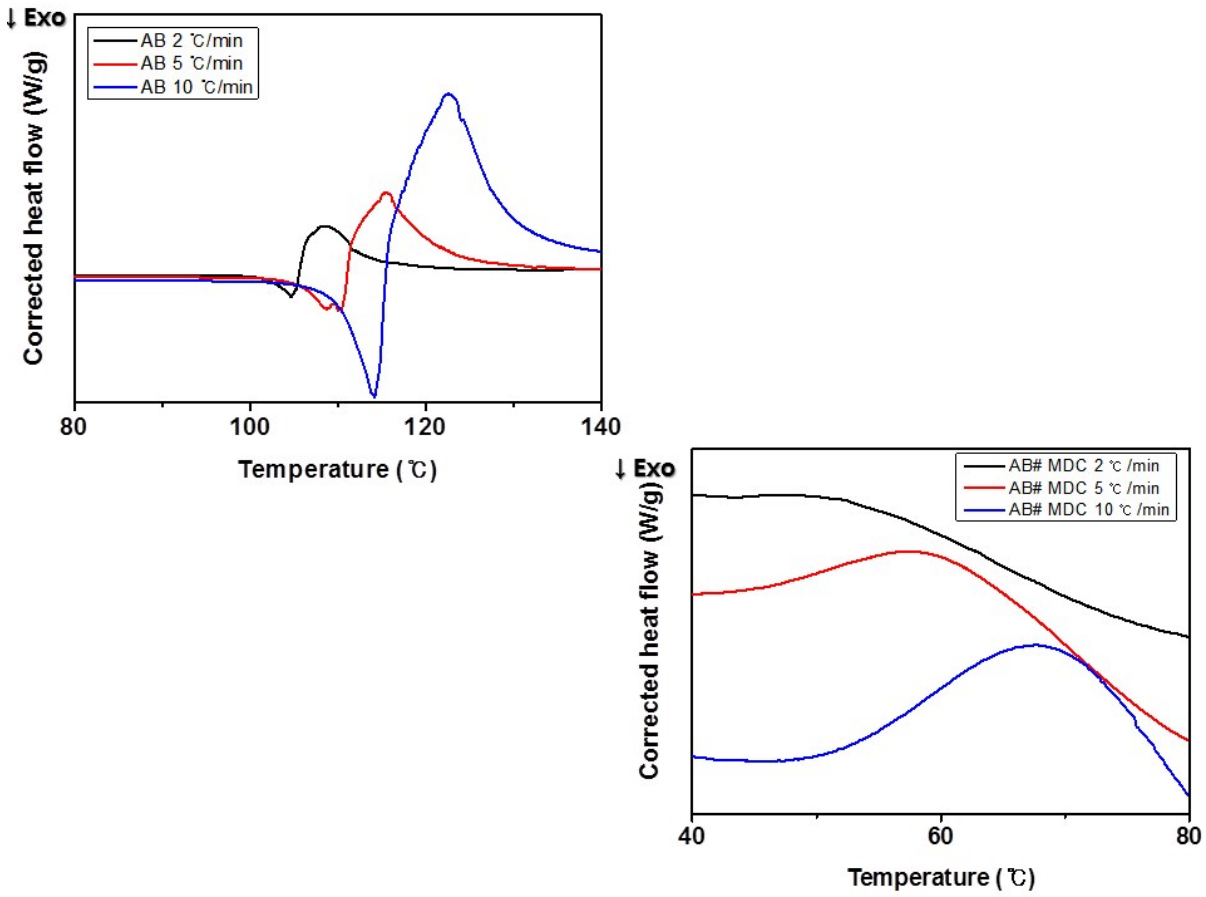
< Figure S2 > The repeated calculation of pore size distribution of MDC, AC, PC and CB



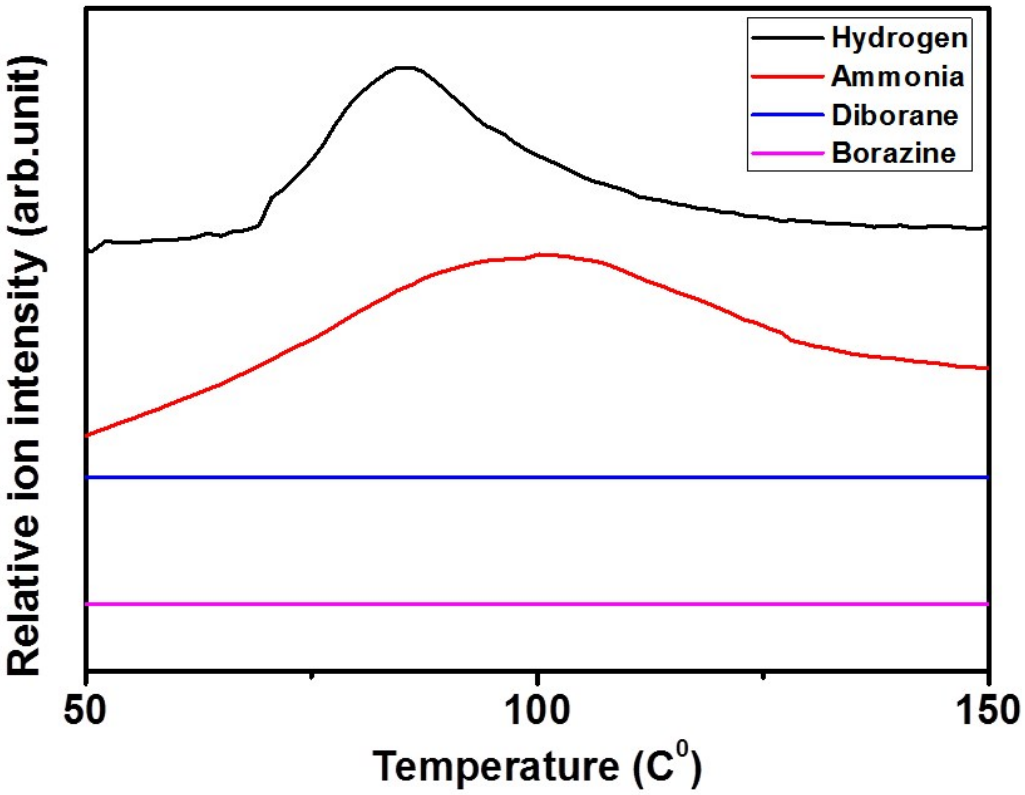
< Figure S3 > Comparison of N2 isotherm at 77 K of pristine samples and AB infiltrated samples



< Figure S4 > Analysis of pore size distribution of MDC and AB#MDC : the highly decrease of pore volume over the pore size range after the infiltration of AB



< Figure S5 > Heat flow from AB#MDC and pristine AB during heat treatment at different heating rate by DSC



< Figure S6 > TPD-MS profile of AB#MDC for evolved gases

	Pore volume (cm^3/g)	BET SSA (m^2/g)
MDC	2.49	2222
AB#MDC	0.38	246
AC	0.91	1093
AB#AC	0.41	272
PC	0.96	2014
AB#PC	0.52	394
CB	0.23	73
AB#CB	0.19	37

< Table S1 > Variation of pore volume and BET SSA after the infiltration of AB

Temperature (℃)	Weight of MDC (mg)	Weight of AB (mg)	Detected H_2 (μmol/ml)	Volume of sample cell (ml)	H_2 (wt%)
60	x	15	0	100	0
70	x	15	$2.10*10^{-2}$	100	$2.80*10^{-2}$
80	x	15	$2.50*10^{-2}$	100	$3.30*10^{-2}$
60	2.5	5	0.91	100	3.60 (2.40)
70	2.5	5	1.43	100	5.70 (3.80)
80	2.5	5	1.78	100	7.1 (4.70)

< Table S2 > Numerical data for calculating H_2 release performance

	AB#MDC	AB+THF
Temperature (℃)	Released H_2 (wt%) $\frac{H_2}{AB} * 100$	Released H_2 (wt%) $\frac{H_2}{AB} * 100$
60	3.6	$1.2*10^{-1}$
70	5.7	$5.2*10^{-1}$
80	7.1	1.0

< Table S3 > H_2 desorption performance of AB#MDC and AB solvated in THF

Support	Exp.Temp (℃)	Time (min)	AB based H_2 density (wt%)	whole sample based H_2 density(wt%)	Ref
MDC	80	30	7.1	4.7	This work
Microporous carbon	80	30	< 8.0[a]	< 5.4[a]	[S1]
Silica aerogel	80	30	0.9	0.5	[S2]
Fe-MIL-53	80	30	< 1.3	< 1.1	[S3]
Li-CMK-3	80	30	< 7[a]	< 3.5[a]	[S4]
Li-CMK-3	60	30	< 6[a]	< 3.0[a]	
Zn-MOF74	75	30	-	< 4[a]	[S5]
Zn-MOF74	65	30	-	< 2[a]	
GO	70	30	< 7.0[a]	<1.8[a]	[S6]
GO	80	30	< 9.0[a]	<2.3[a]	
MOF-5	75	30	< 5.5	< 0.2	[S7]

< Table S4 > Comparison of the performances of AB infiltrated porous materials within 80 ℃

a : calculated value for the same experimental condition, referring to the data in previous studies

References

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