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Chemical affinity assisted H_2 isotope separation using Ca-rich onion-peel-derived nanoporous carbon composite

Raeesh Muhammad,[a,†] Suhwan Kim,[a,†] Jaewoo Park,[a] Minji Jung,[a] Myoung Eun Lee,[b] Jaewoo Chung,* [b] Haenam Jang* [a,c] and Hyunchul Oh,* [a,c]

[a]Department of Energy Engineering, Gyeongsang National University, Jinju 52725, Republic of Korea

[b]Department of Environmental Engineering, Gyeongsang National University, Jinju 52725, Republic of Korea

[c]Future Convergence Technology Research Institute, Jinju 52725, Republic of Korea

Email* oh@gnu.ac.kr (Prof. Hyunchul Oh)

Email* jhn@gnu.ac.kr (Prof. Haenam Jang)

Email* jwchung@gnu.ac.kr (Prof. Jaewoo Chung)

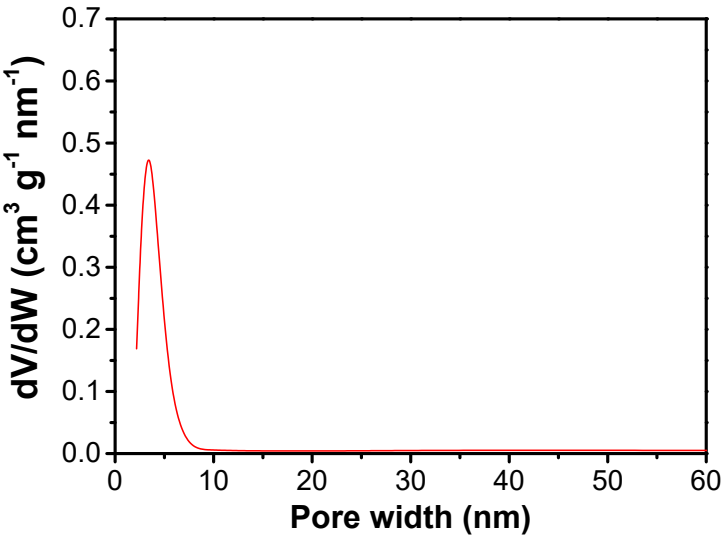

Fig. S1. Pore size distribution of OPC-AC.

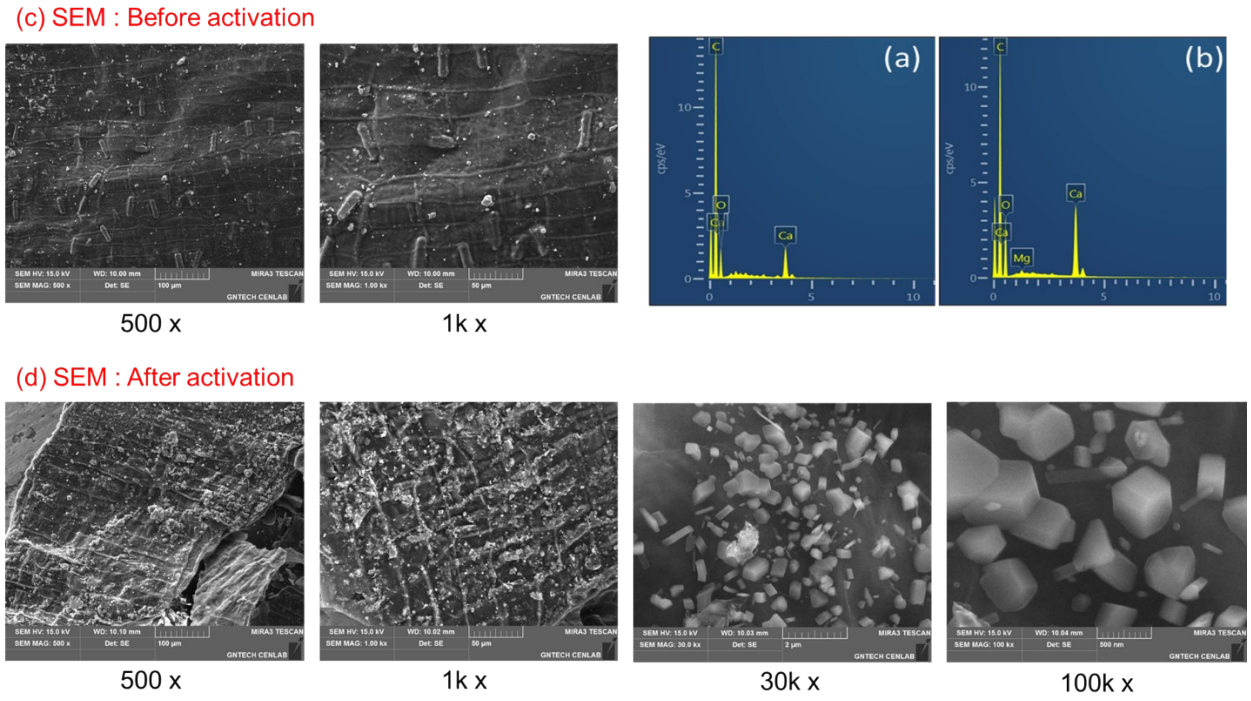

Fig. S2. Elemental analysis of (a) OPC and (b) OPC-AC, and SEM images (c) OPC and (d) OPC-AC

Table S1 EDS Data of OPC and OPC-AC

Sample	C [wt%]	O [wt%]	Ca [wt%]	Mg [wt%]	Total
OPC	73.95	19.66	6.39	-	100
OPC-AC	52.16	30.25	17.24	0.34	100

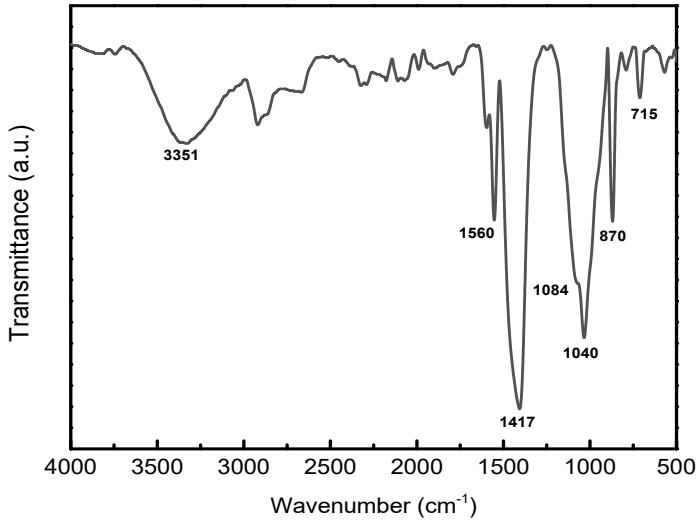

Fig. S3. FT-IR of OPC-AC.

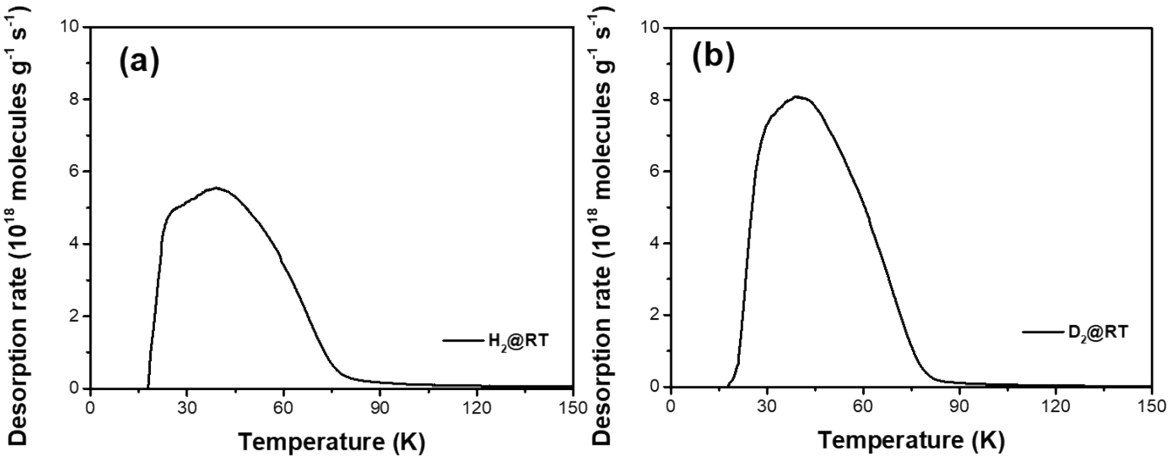

Fig. S4. Pure gas (a) H_2 and (b) D_2 thermal desorption spectra measured with heating rate of 3 K min^{-1}

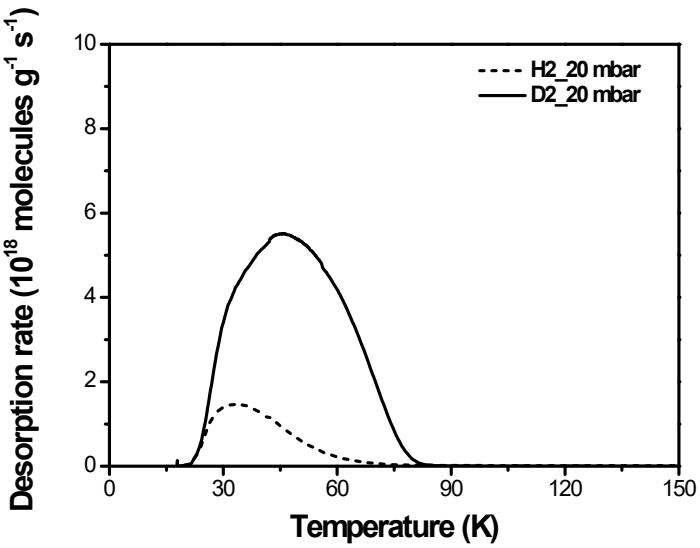

Fig. S5. D_2/H_2 thermal desorption spectrum measured at 25 K with a heating rate of 3 K min^{-1}.

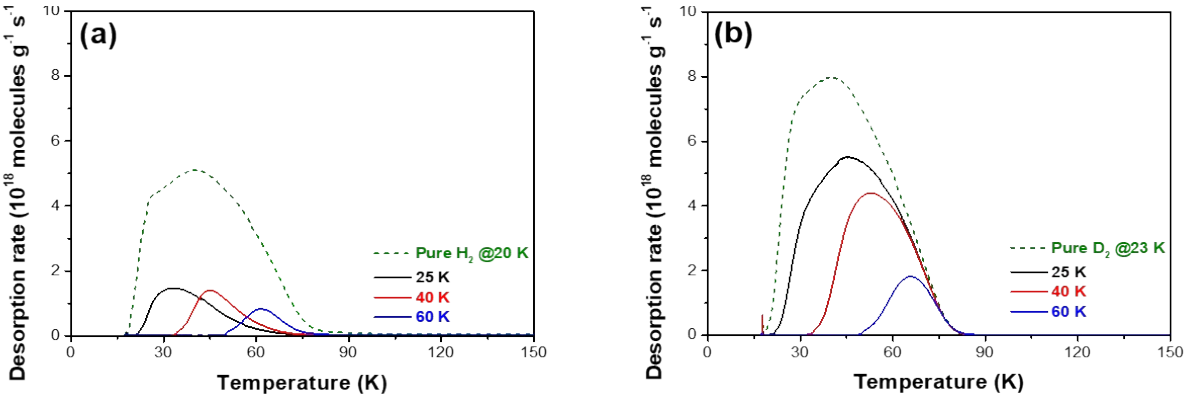

Fig. S6. Comparison of H_2 and D_2 desorbed amount when using pure gas and 1:1 mixture, respectively at various exposure temperatures: 25 K (black), 40 K (red), 60 K (blue), and pure H_2 and D_2 TDS (olive) for a comparison of gas uptake.

Note that one mixture measurement of TDS at a given T_{exp} provides each hydrogen and deuterium signal individually. The hydrogen (Figure S6a) and deuterium (Figure S6b) signals are presented separately to show temperature dependence. All olive dot-curves in Figure S6 imply the pure gas TDS (loading at room temperature and then cooling below 20 K; Figure S4), in which all adsorption sites are assumed to be accessible for both isotopes.

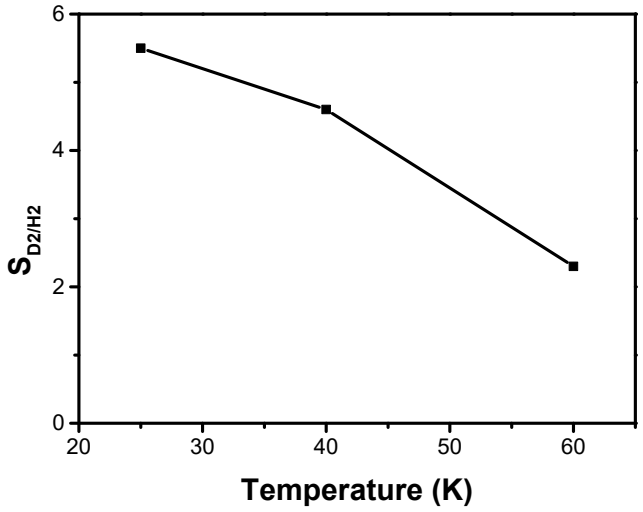

Fig. S7. $S_{D2/H2}$ at 20 mbar and various exposure temperatures.

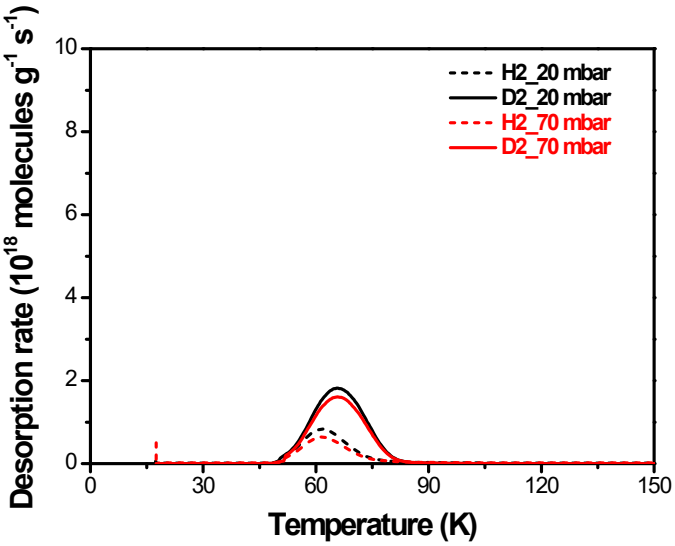

Fig. S8. D_2/H_2 thermal desorption spectrum measured at 60 K with a heating rate of 3 K min^{-1}

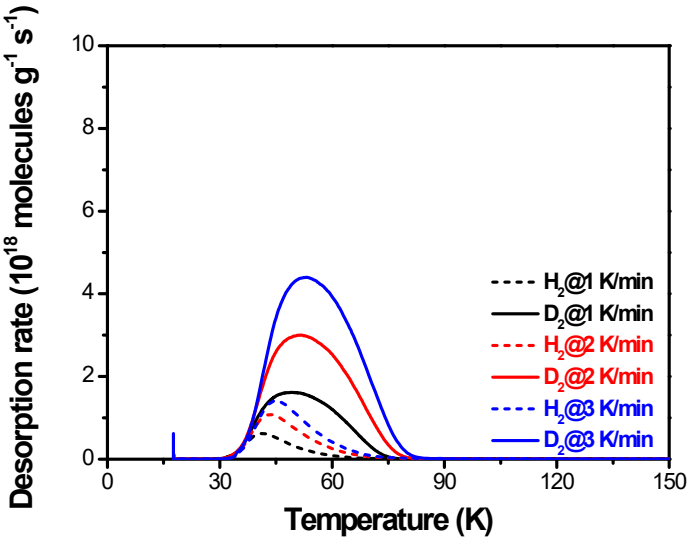

Fig. S9. D_2/H_2 thermal desorption spectrum measured at different heating rates.