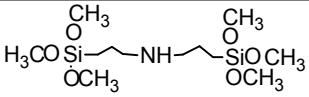
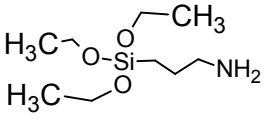
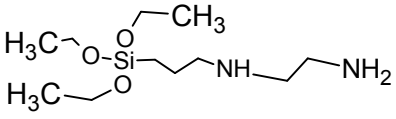
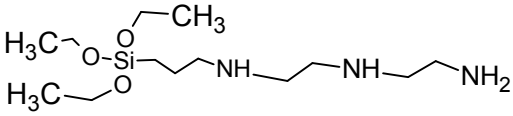
Supporting Information

Template-free Amine-Bridged Silsesquioxane with dangling amino groups and its CO_2 adsorption performance

Dang Viet Quang, Abdallah Dindi, Khalid A. Al-Ali, Mohammad R.M. Abu-Zahra*

Table S1. List of aminosilanes used for research and their structure

No	Aminosilane precursors	Structure
1	Bis[3-(trimethoxysilyl)proyl]amine (BTMSPA)	
2	3-Aminopropyltriethoxysilane (APTES)	
3	[3-(2-Aminoethylamino)propyl]trimethoxysilane (DAMS)	
4	N-(3-trimethoxysilylpropyl)diethylenetriamine (TAMS)	

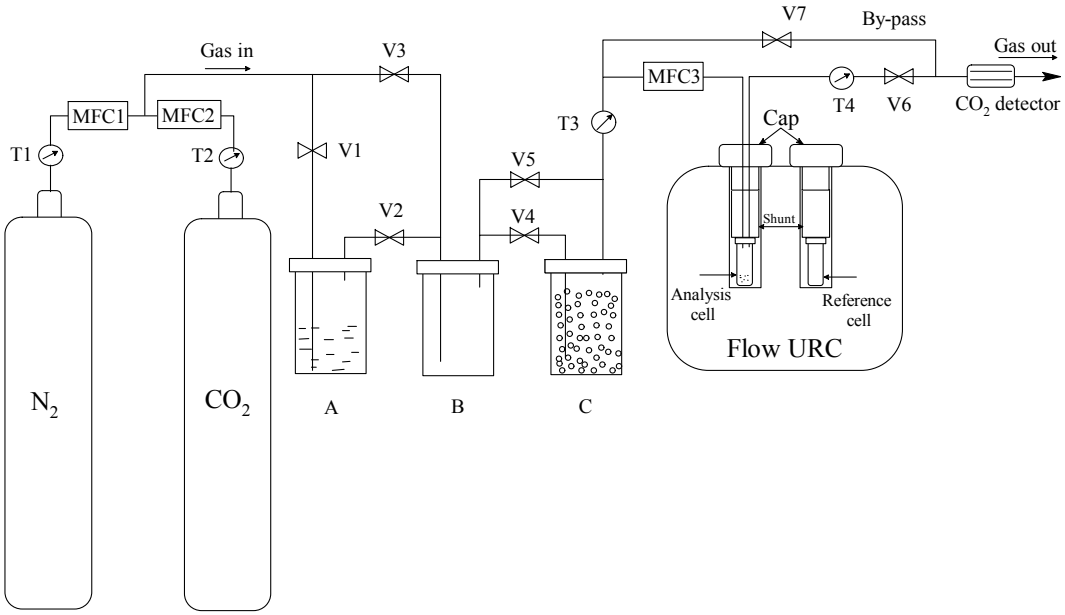


Figure S1. A schematic illustration of the CO_2 adsorption experiment

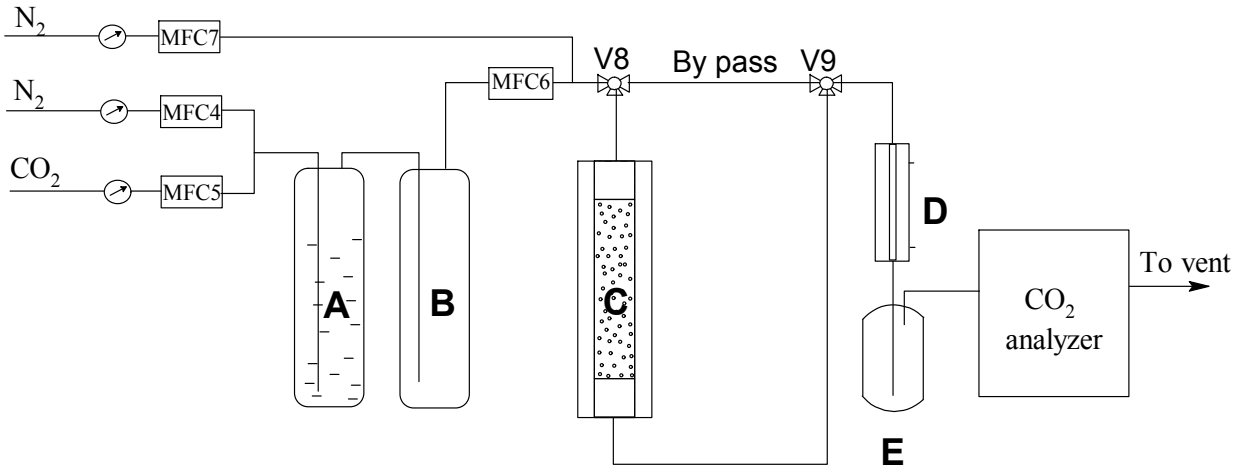


Figure S2. Experimental Setup of the packed bed reactor for investigating the adsorbent recyclability

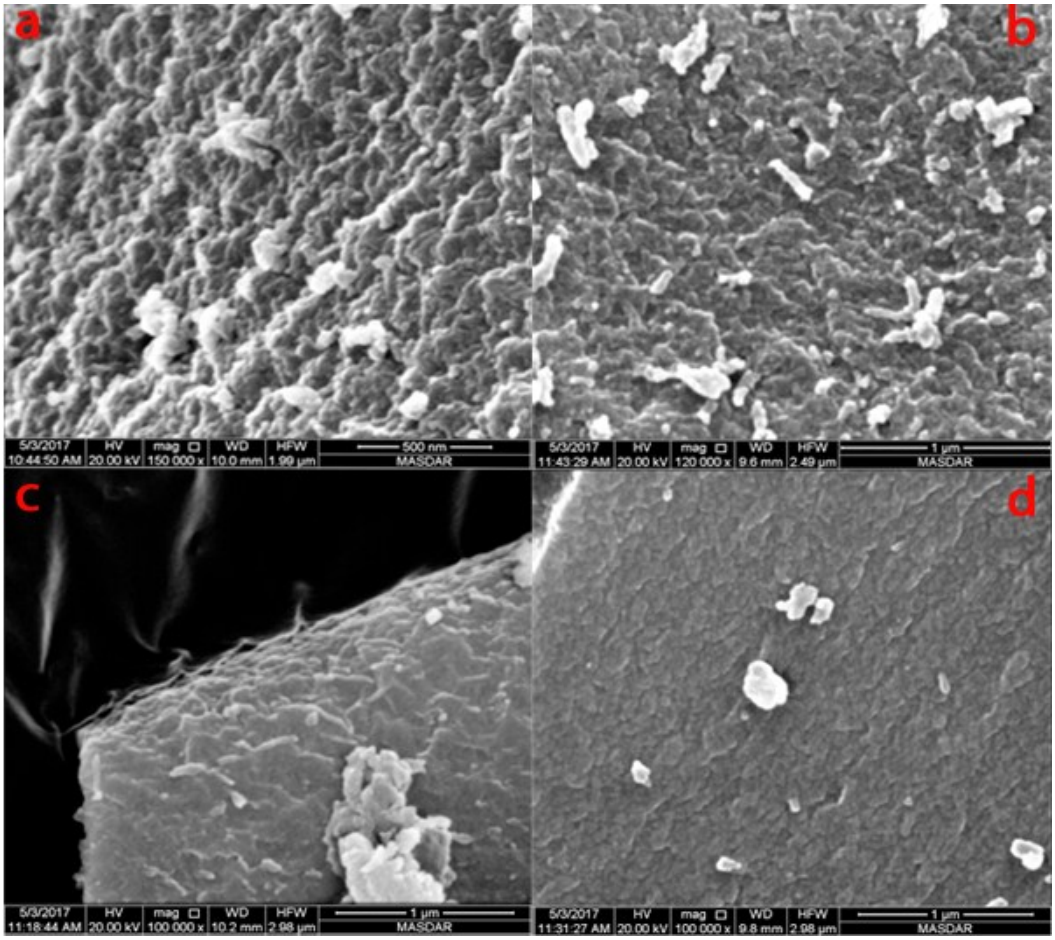


Figure S3. SEM images of ABS (a), APTES-ABS (b), DAMS-ABS (c), and TAMS-ABS (d)

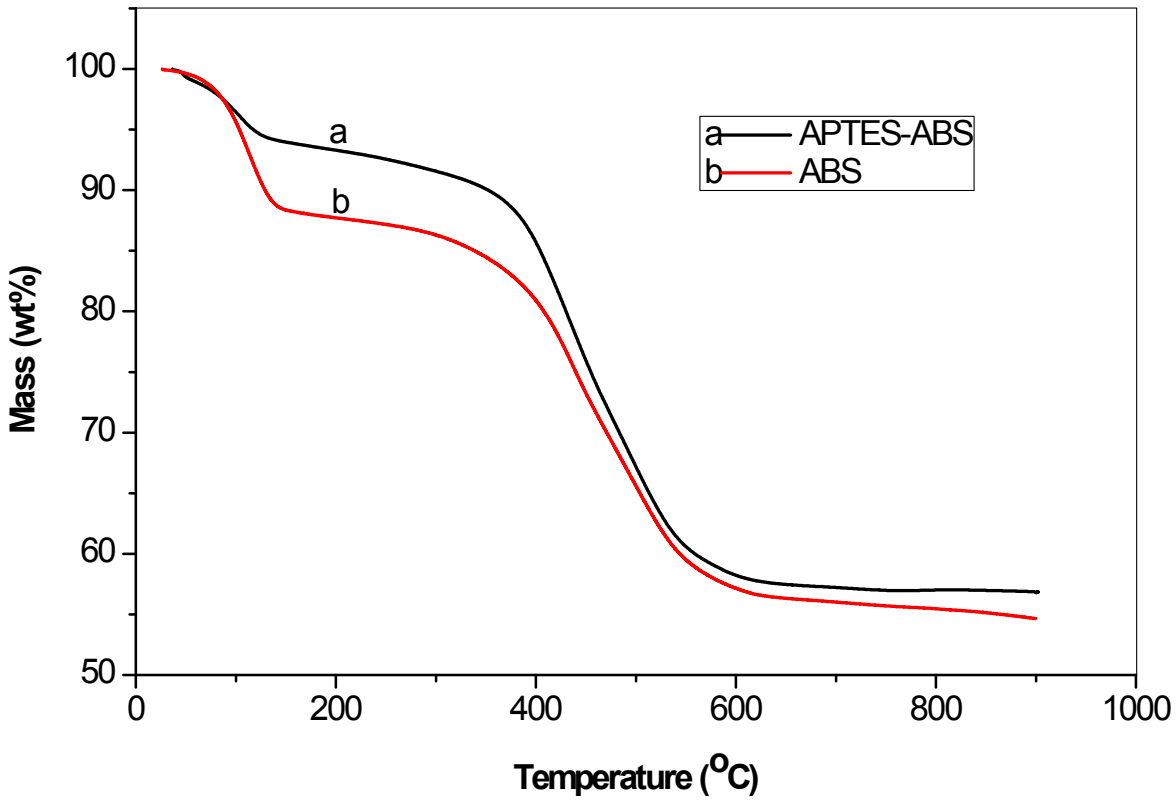


Figure S4. TGA profile of ABS and APTES-ABS

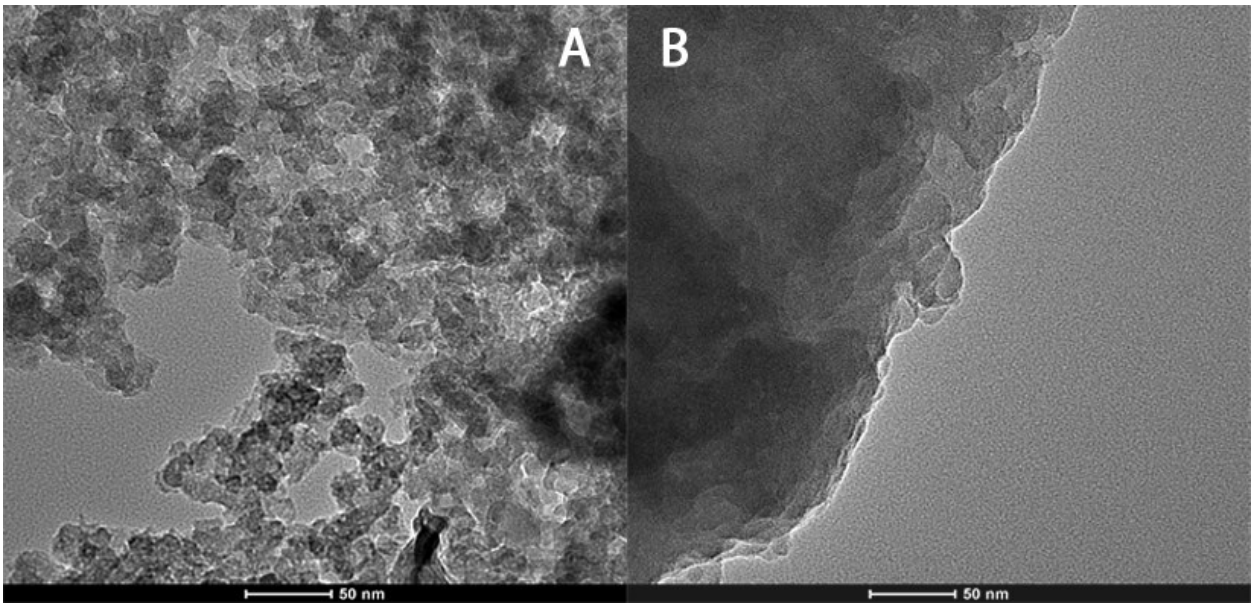


Figure S5. TEM images of samples with the APTES/MTMSPA molar ratio of 0.5 (A) and 0.75 (B)

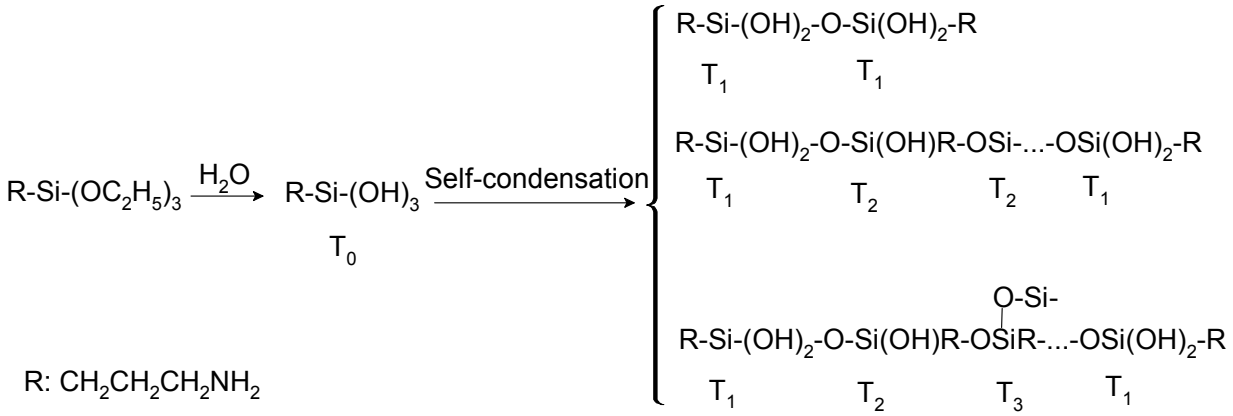


Figure S6. APTES self-condensation illustration. T_0 is the APTES hydrolyzed monomer with 3 unbonded OH groups, T_1 is single-side bonded APTES with 2 unbonded OH groups, T_2 is double-side bonded APTES with only one unbonded OH group and T_3 3-side bonded APTES with no unbonded OH group.

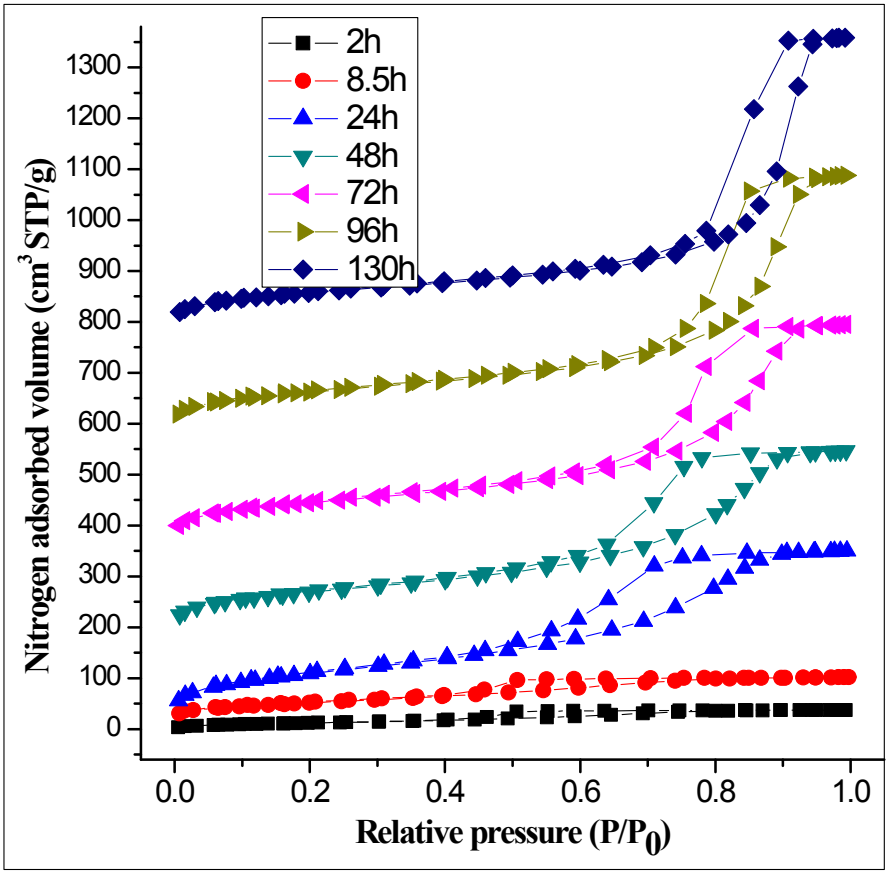


Figure S7. Nitrogen adsorption isotherms of APTES-ABS samples aged in water. Shift value for Y axis: 2h + 0, 8.5h +20, 24h + 30, 48h + 200, 72h + 380, 96h + 600, and 130h + 800.

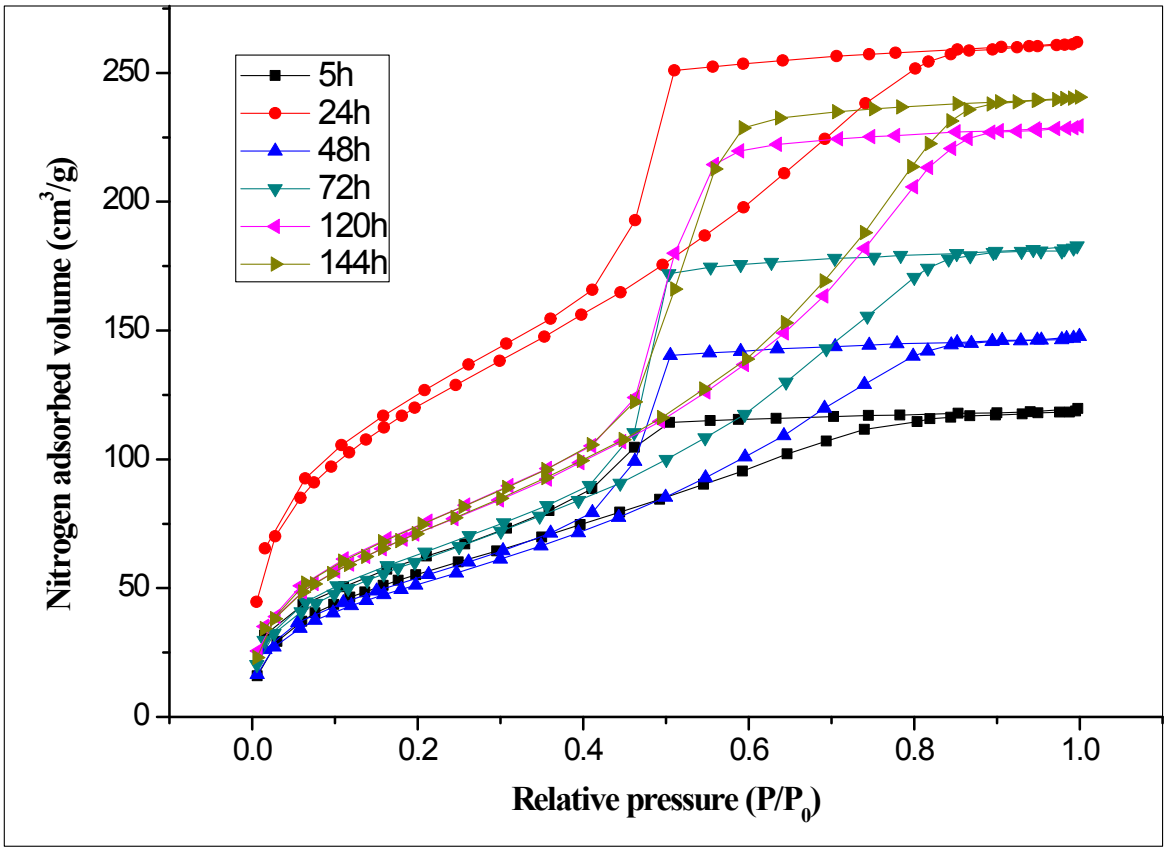


Figure S8. Nitrogen adsorption isotherms of APTES-ABS samples aged in ethanol

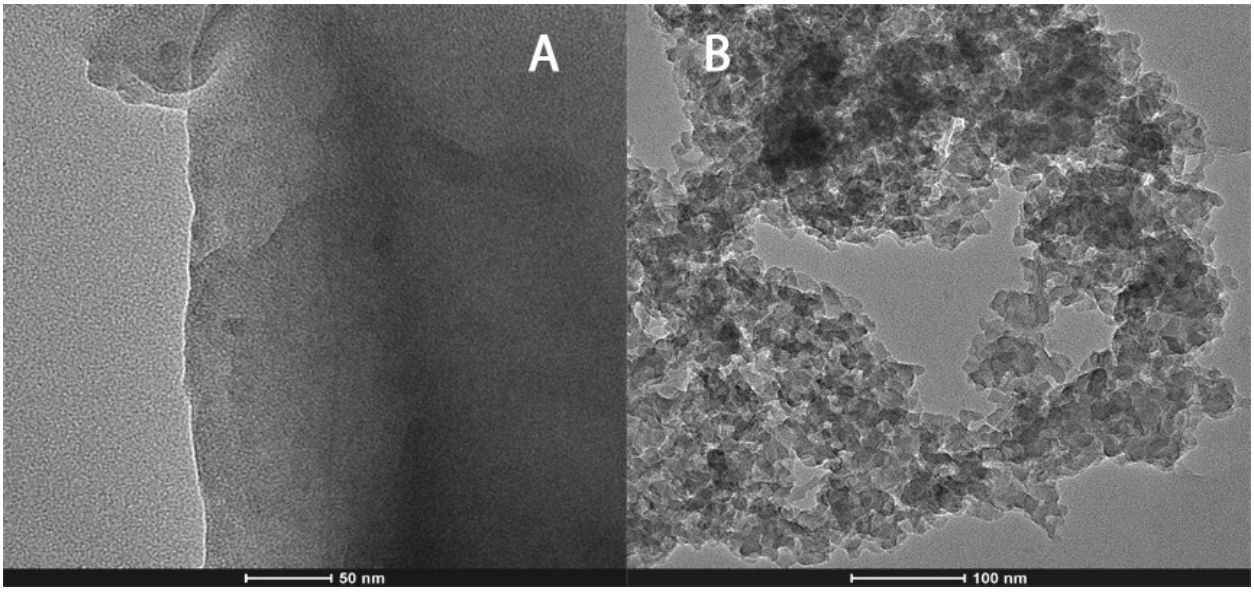


Figure S9. TEM images of samples aged in water for 2h (A) and 130h (B)

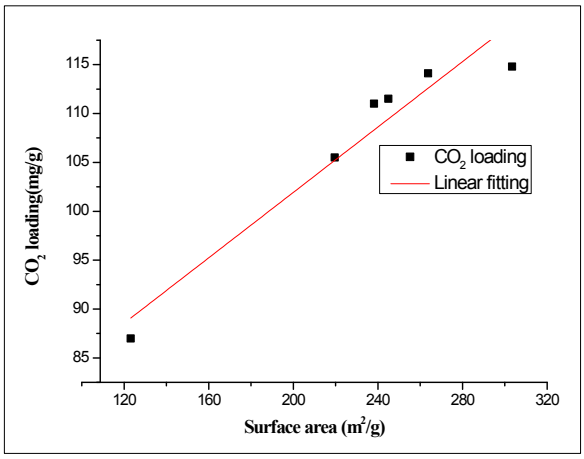


Figure S10. Relation between surface area and CO_2 loading of APTES-ABS aged in water

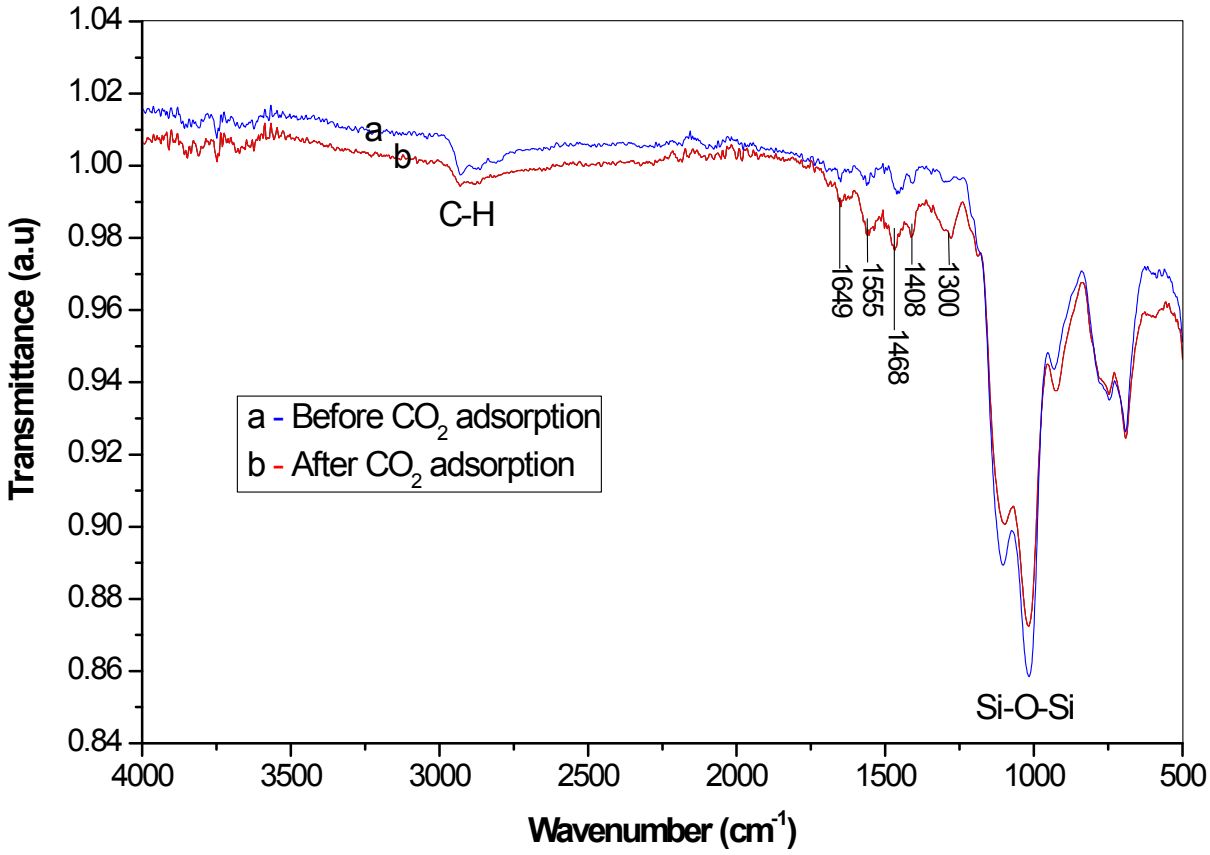


Figure S11. FTIR spectra of APTES-ABS aged for 120h in ethanol before (a) and after (b) CO_2 adsorption. Sample was activated at 125 ^oC in nitrogen flow for 4h and then used for FTIR analysis and CO_2 adsorption.

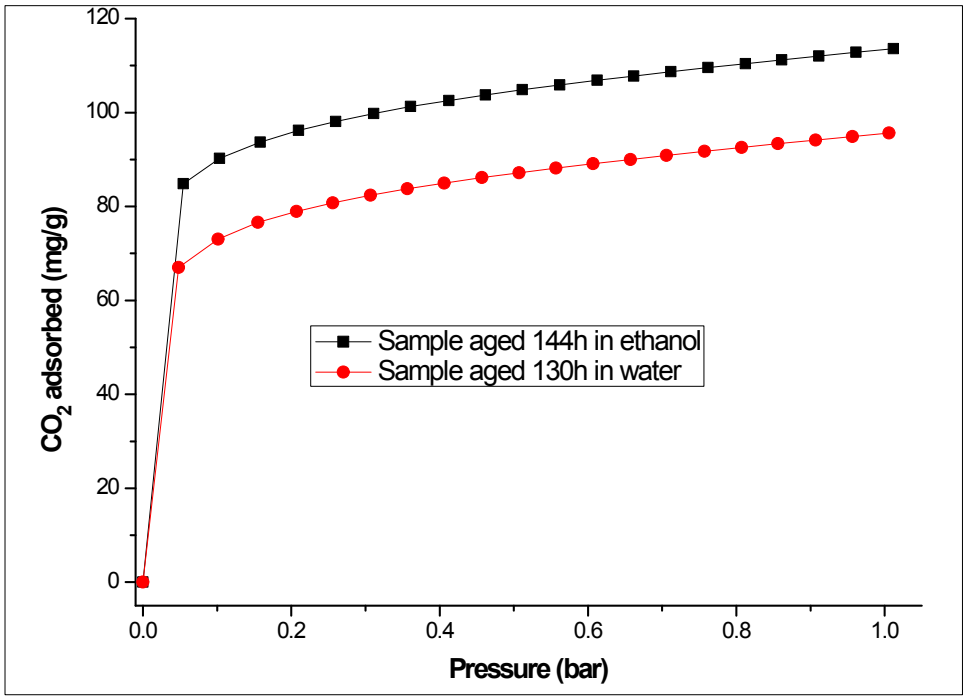


Figure S12. CO_2 adsorption isotherms of samples aged 130h in water (after 14 months) and 144h in ethanol (after 12 months).

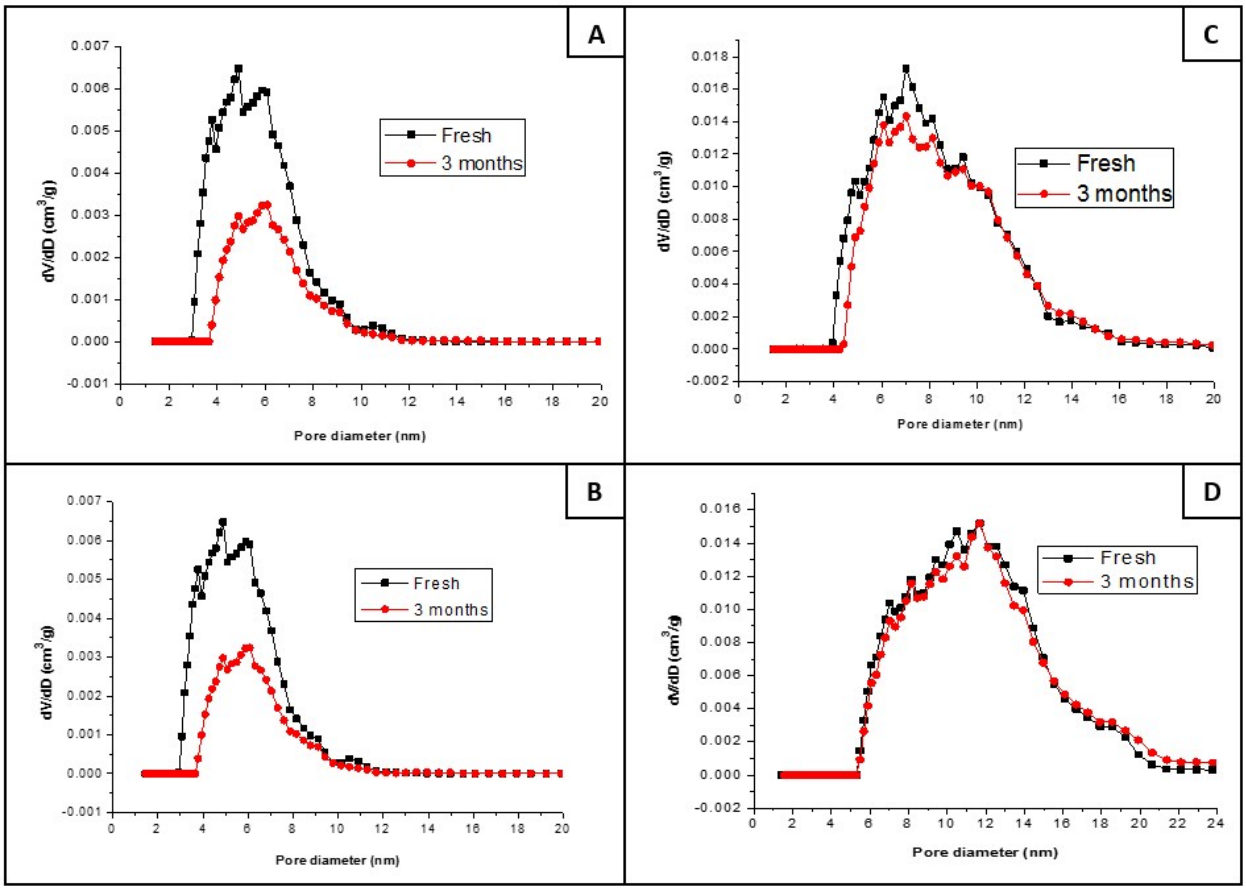


Figure S13. Pore size distribution of fresh APTES-ABS samples and after 3 month storage. Samples were aged in water for 8.5 h (A), 24h (B), 48 h (C) and 72 h (D).

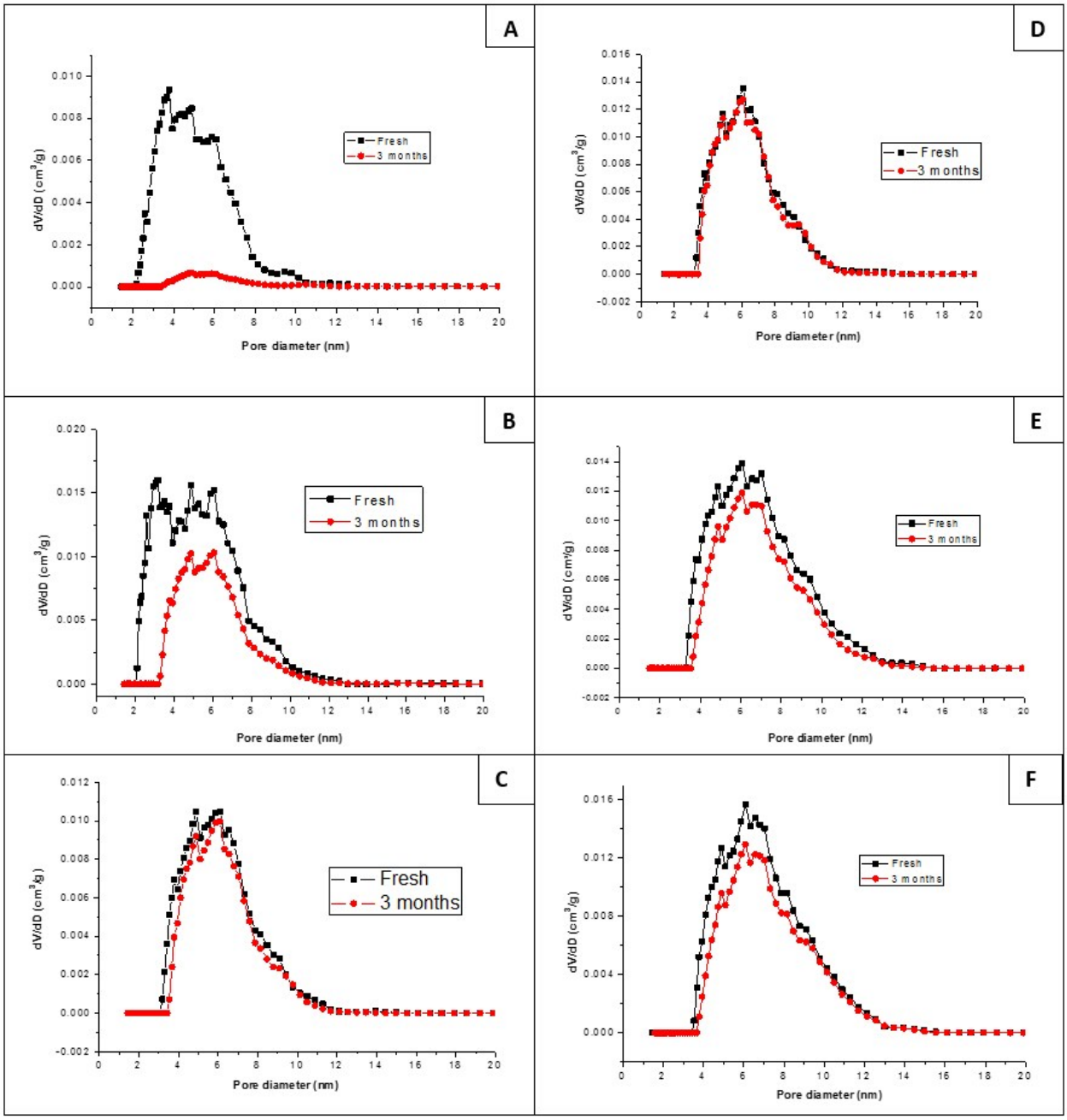


Figure S14. Pore size distribution of fresh APTES-ABS samples and after 3 month storage. Samples were aged in water for 5 h (A), 24h (B), 48 h (C), 72 h (D), 120 h (E), and 144h (F).