SUPPORTING INFORMATION

Three-Dimensional Graphene-Based Porous Adsorbents for Postcombustion CO_2 Capture

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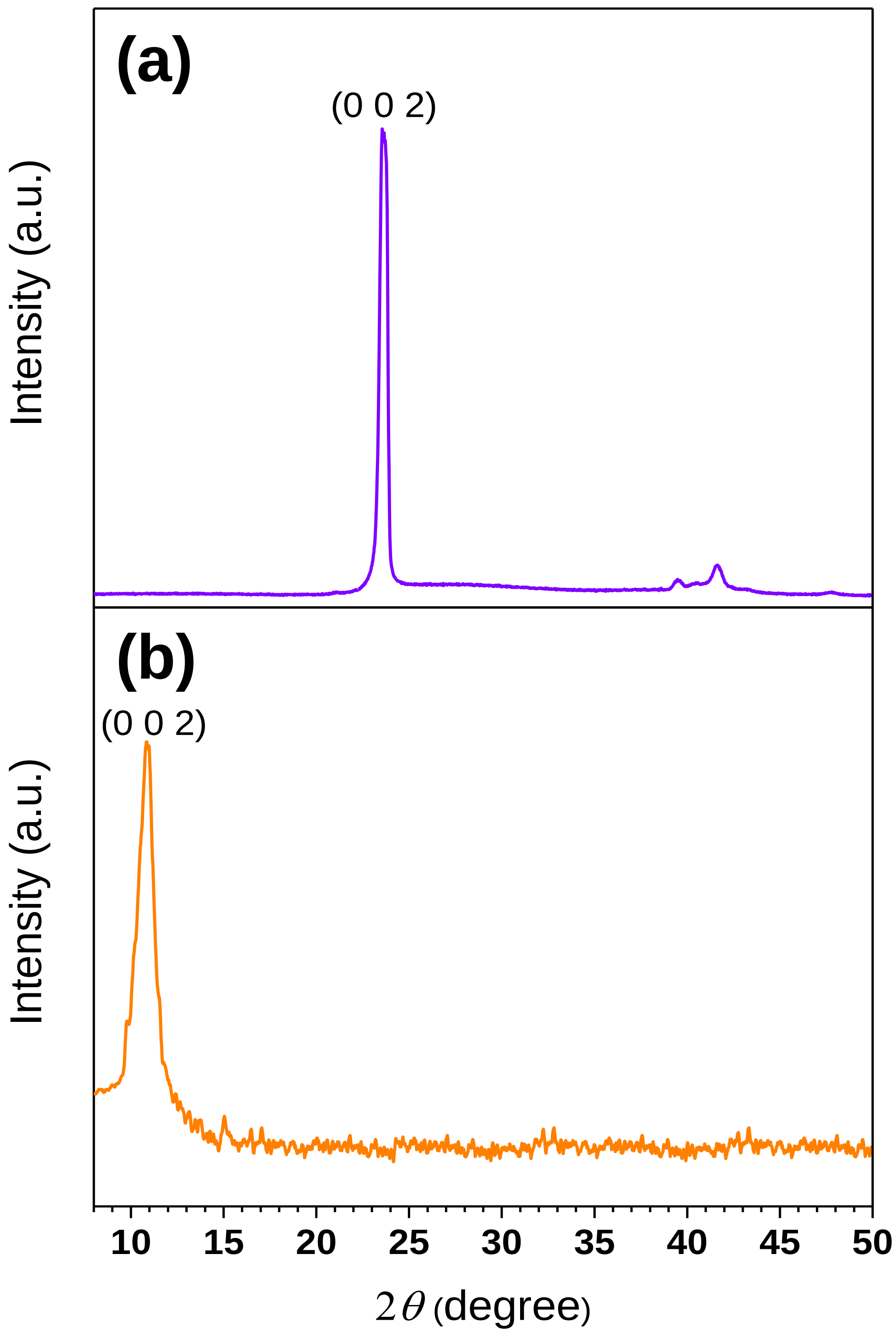

Figure S1. XRD patterns of (a) natural graphite and (b) GO.

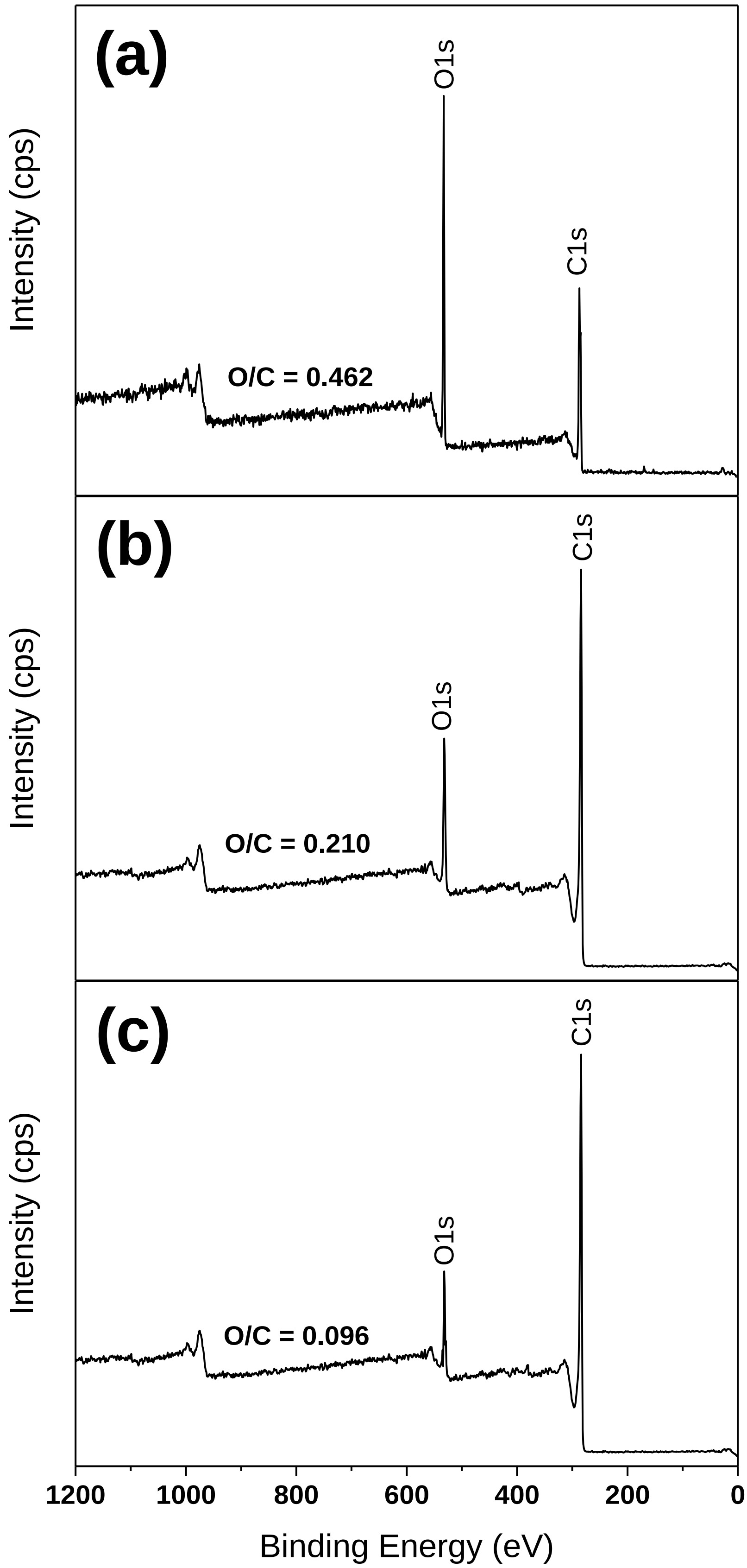

Figure S2. XPS survey scan spectra of (a) GO, (b) RGO and (c) a-RGO-950.

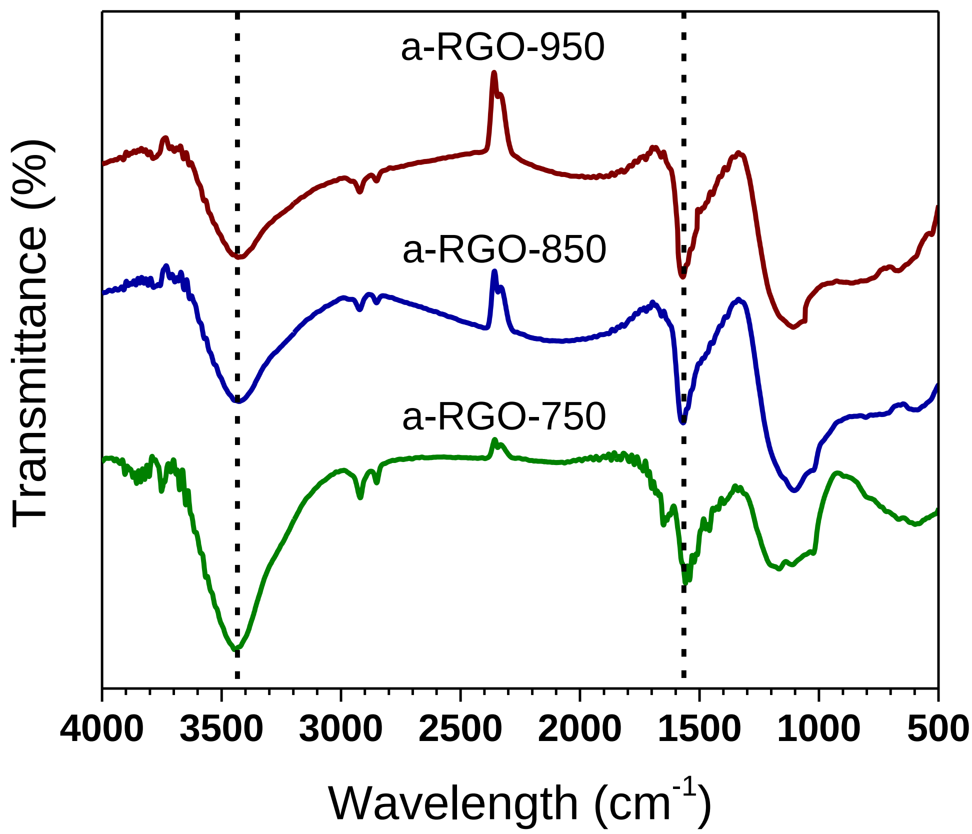

Figure S3. FTIR spectra of the a-RGO-*X* samples.

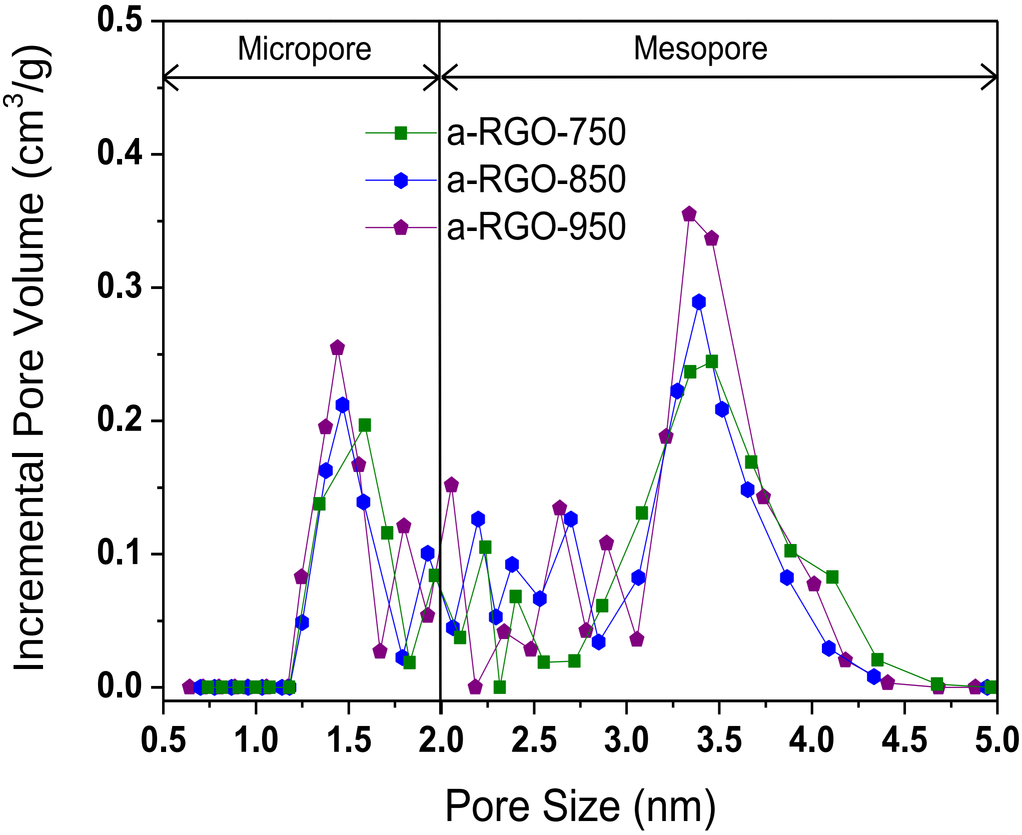

Figure S4. NLDFT pore size distributions of the a-RGO-*X* materials.

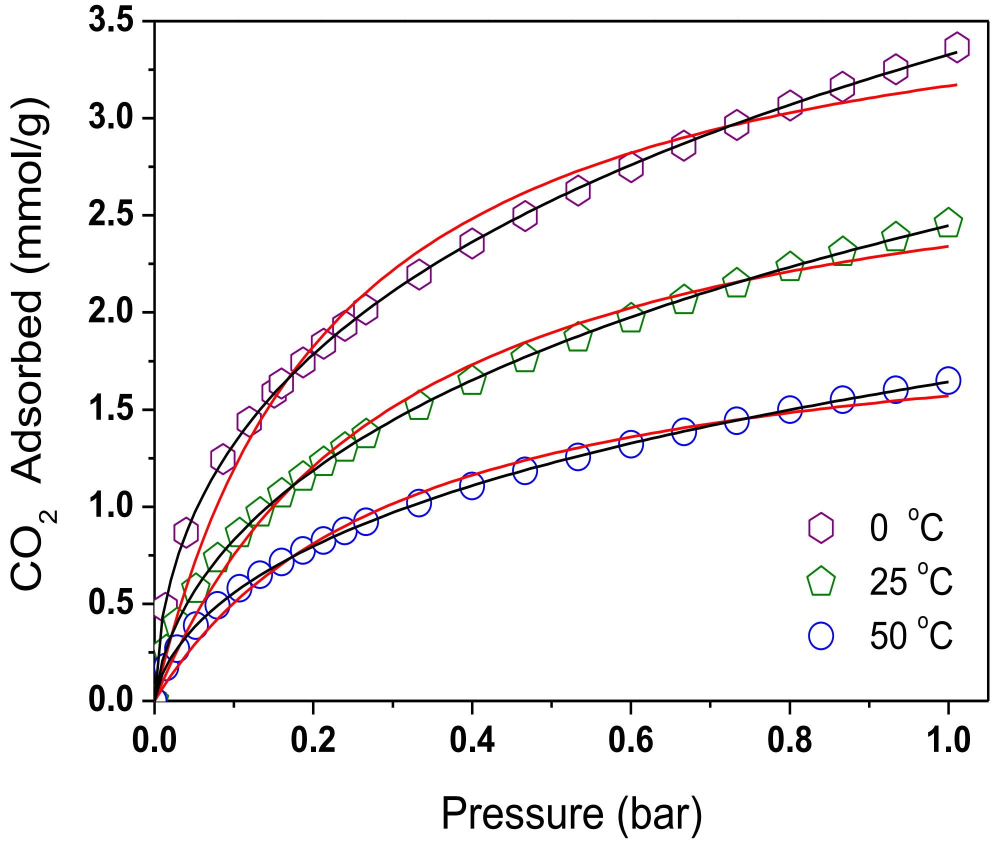

Figure S5. Effect of temperature on CO_2 adsorption by a-RGO-950 and nonlinear fit of the Langmuir (—) and Toth (—) isotherm models to the experimental equilibrium data.

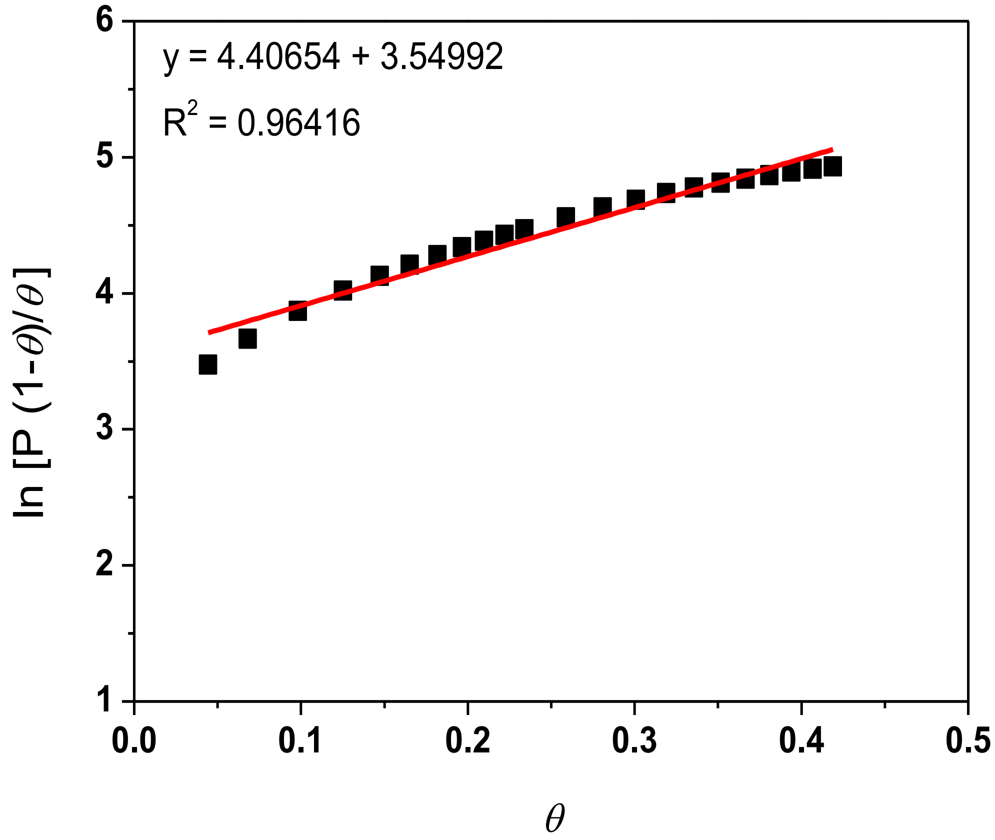

Figure S6. Fowler-Guggenheim plot for CO_2 adsorption on a-RGO-950 at 25 °C.

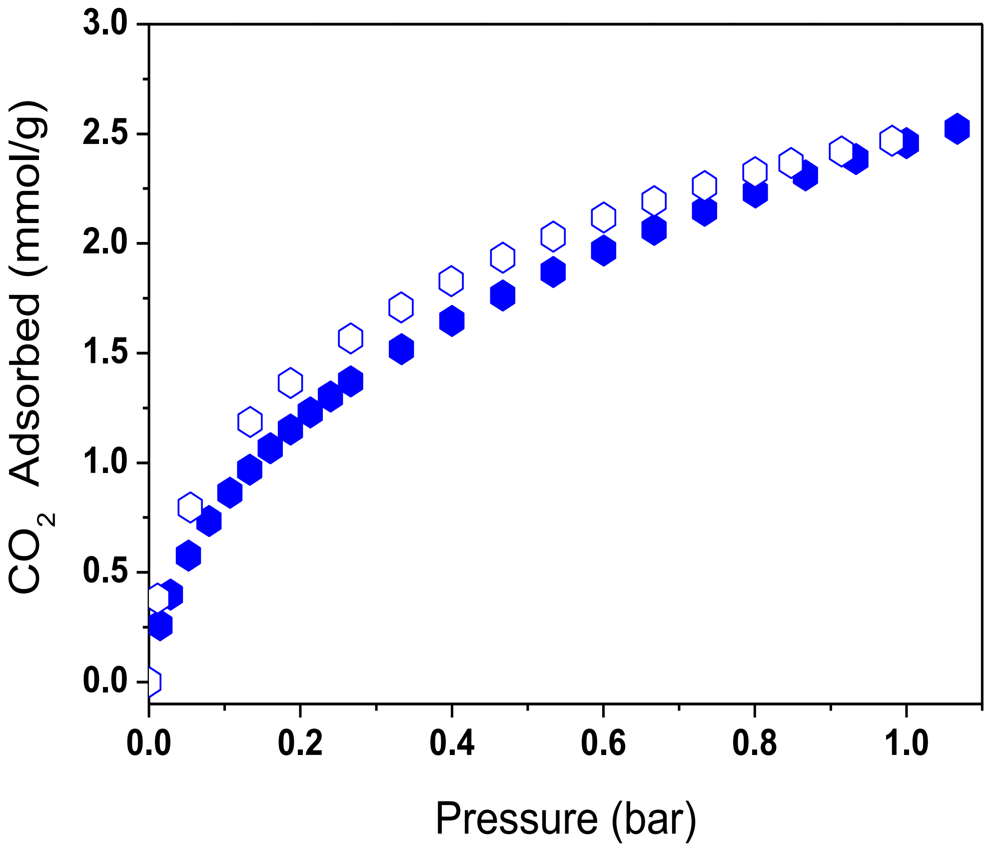

Figure S7. CO_2 adsorption/desorption isotherms of a-RGO-950 at 25 ^{o}C (solid symbols denote adsorption and open symbols denote desorption).

Table S1. Surface elemental composition of GO, RGO and the a-RGO-*X* samples as determined from XPS measurements.

Sample	O content (at.%)	C species distribution (at.%)		
		285.0 eV	287.1 eV	288.7 eV
GO	31.6	29.8	33.5	5.1
RGO	17.4	65.1	12.6	4.9
a-RGO-750	11.7	77.9	7.1	3.3
a-RGO-850	9.5	81.2	6.6	2.7
a-RGO-950	8.8	83.4	5.7	2.1

Table S2. Comparison of the zero-coverage isosteric heat of CO_2 adsorption for a-RGO-950 with other major types of solid adsorbents.

Adsorbent	**—$Q_{0,st}$ (kJ mol^{-1})**	**Reference**
Zeolites		
KCHA[a]	52.2	Ridha and Webley.[1]
K-BEA[b]	59.6	Yang *et al.*[2]
Na-A[c]	48.1	Zukal *et al.*[3]
Na-X[d]	42.5	Li *et al.*[4]
MOFs		
Cu-BTTri-mmen[e]	96	McDonald *et al.*[5]
TBA@bio-MOF-1[f]	55	An and Rosi.[6]
ZIF-68[g]	25.1	Liu *et al.*[7]
Li@CNT@$Cu_3(BTC)_2$[h]	36.8	Xiang *et al.*[8]
Activated carbons		
Ammonia-modified activated carbon	73.2	Shafeeyan *et al.*[9]
Activated carbon from oil palm shell	31.5	Hoseinzadeh Hesas *et al.*[10]
Pitch-based activated carbon beads	23.2	Shen *et al.*[11]
N-doped activated carbon	58	Yang *et al.*[12]
a-RGO-950	**27.4**	**This study**

[a] Potassium chabazite

[b] Potassium-exchanged zeolite beta

[c] Sodium form of zeolite A

[d] Sodium form of zeolite X

[e] $H_3[(Cu_4Cl)_3(BTTri)_8(N,N'\text{-dimethylethylenediamine})_{12}]$

[f] $Zn_8(adenine)_4(biphenyl\text{-}4,4'\text{-dicarboxylate})_6O_3$.tetrabutylammonium

[g] Zeolitic imidazolate framework-68

[h] Li-doped carbon nanotube-impregnated Cu_3(1,3,5-benzenetriscarboxylate)$_2$

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