Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting Information

Photoluminescent chromium moybdate cluster coordinated with rare–earth cations: Synthesis, structure, optical and magnetic properties

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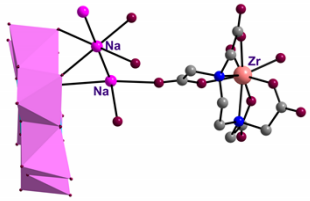
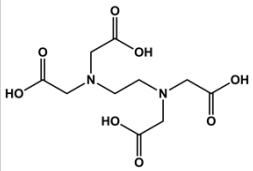
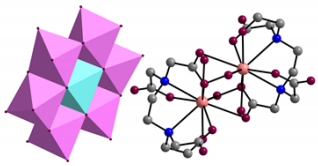
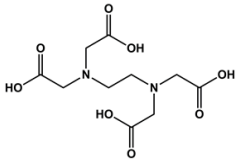
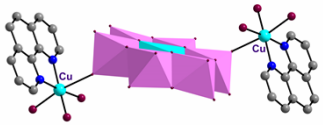
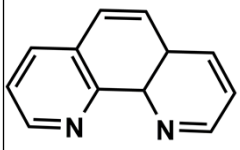
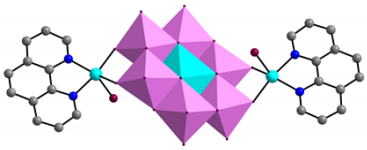
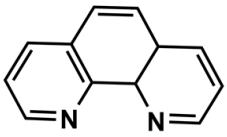
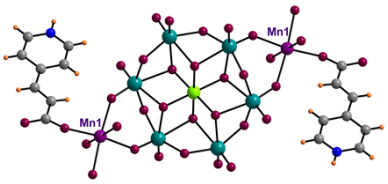
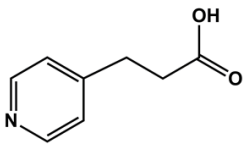
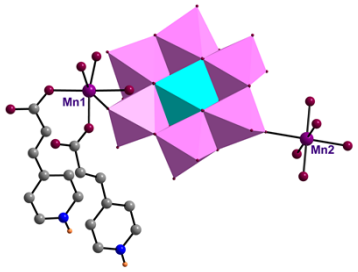
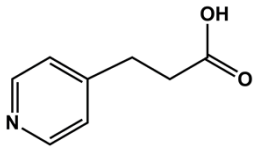
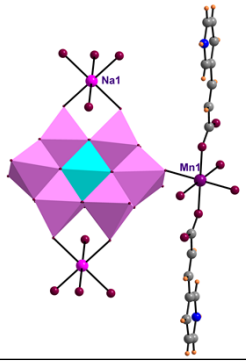
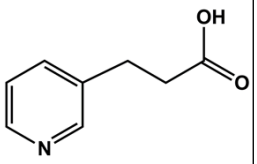
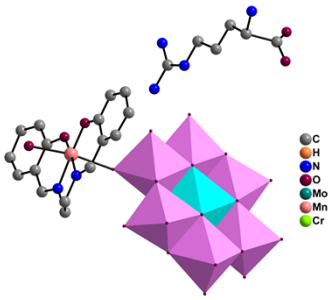
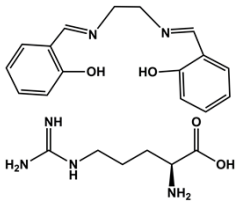
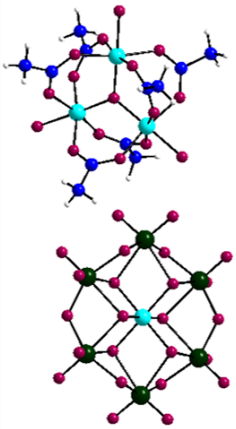
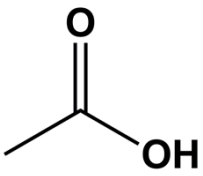
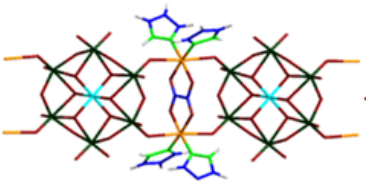
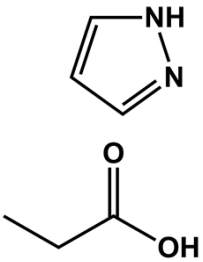
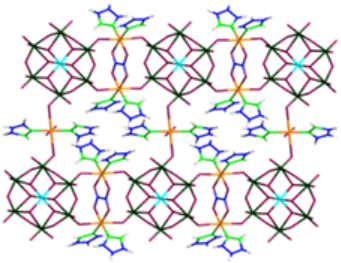
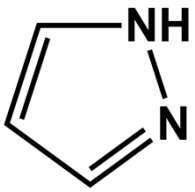
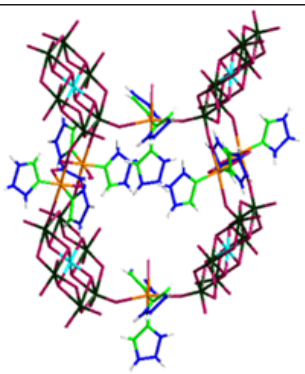
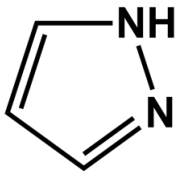
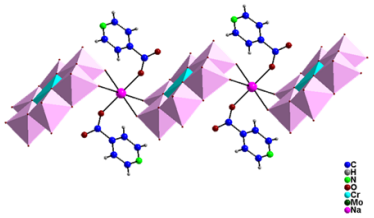
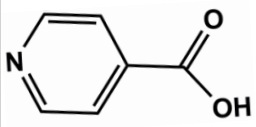
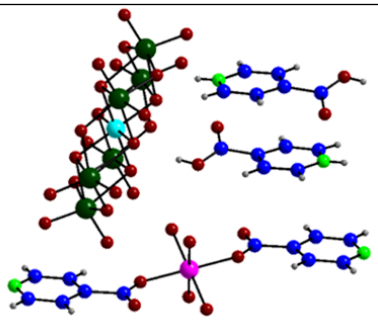
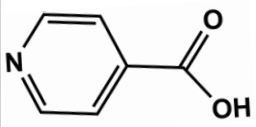
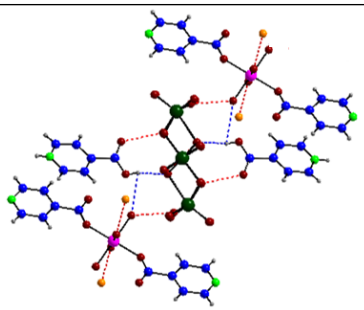
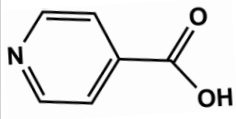
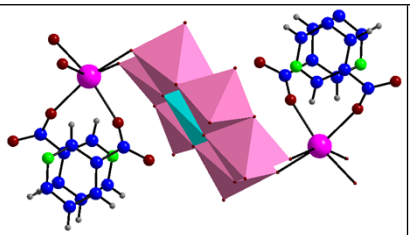
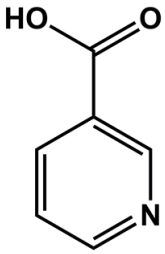
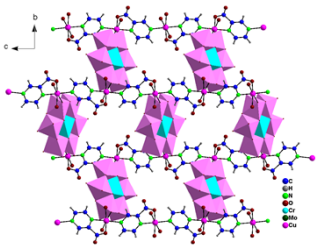
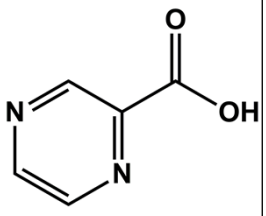
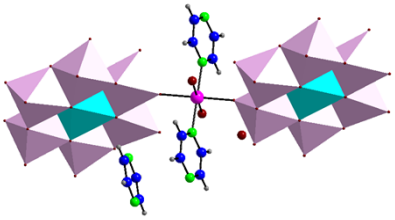
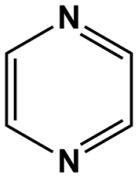
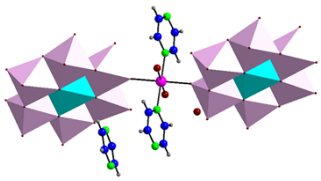
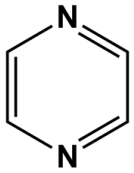
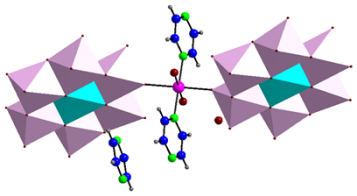
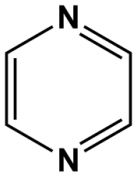
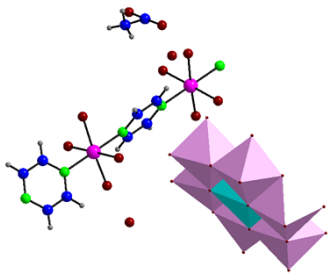
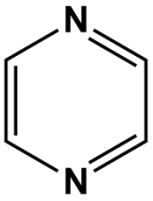
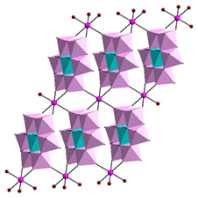
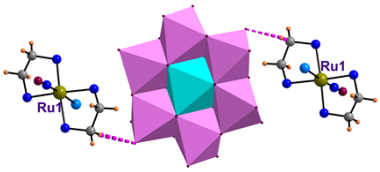
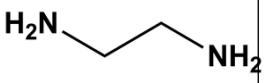
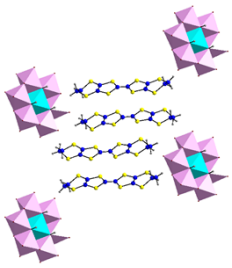
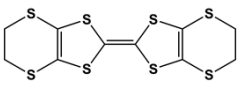
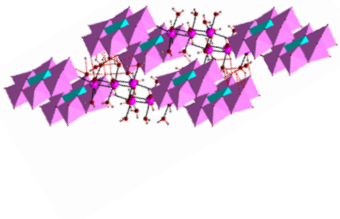
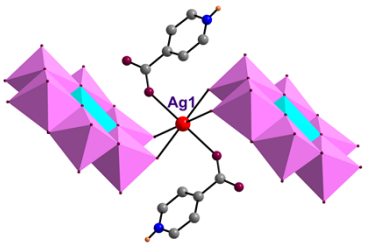
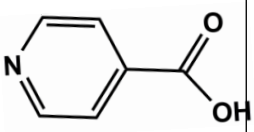
Table S1. Chromium Anderson–Evans cluster based solids reported in the literature

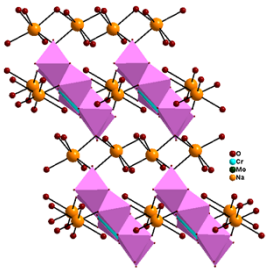
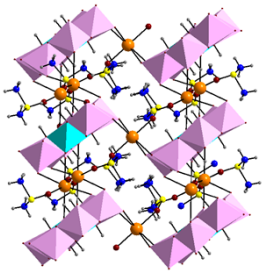
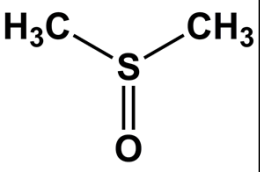
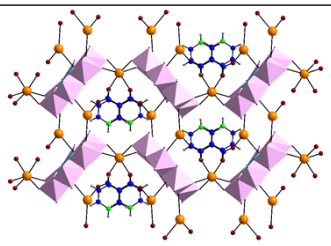
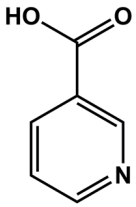
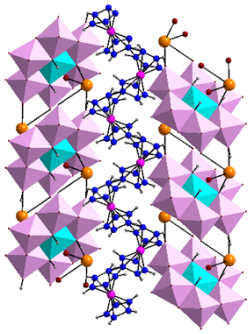
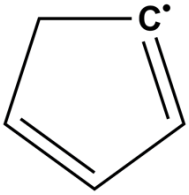
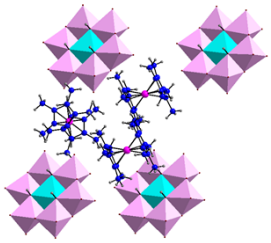
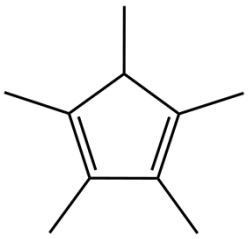
S. No.	Compound	Cell parameters	Structural description	Organic	Reference
1.	$Na_3[ZrEDTA(H_2O)_2]_2[H_6CrMo_6O_{24}].10H_2O$	*P* ī *a* / Å = 7.959(5) *b* / Å = 10.937(8) *c* / Å = 17.630(12) α /° = 74.772(8) β/° = 81.772(9) γ/° = 75.439(9) Z = 1			*Solid State Sciences,* **2011**, *13*, 1122
2.	$[Ce_3(HEDTA)_2(H_2O)_9][H_6CrMo_6O_{24}].13H_2O$	*P* ī *a* / Å = 13.759(1) *b* / Å = 15.271(1) *c* / Å = 19.664(2) α /° = 72.386(1) β/° = 71.489(1) γ/° = 88.591(1) Z = 2			*Solid State Sciences,* **2011**, *13*, 1122
3.	$[\{Cu(C_{12}N_2H_8)(H_2O)_3\}_2\{H_6CrMo_6O_{24}\}][\{Cu_2(C_2O_4)(C_{12}N_2H_8)_2\}\{H_6CrMo_6O_{24}\}]\cdot 12H_2O$	*P* ī *a* / Å = 11.477(10) *b* / Å = 14.099(12) *c* / Å = 17.175(16) α /° = 76.829(10) β/° = 72.209(10) γ/° = 80.252(10) Z = 1			*Inorg. Chem. Comm.,* **2011,** *14*, 384
4.	$[Cu(phen)H_2O]_2[H_5CrMo_6O_{24}].5H_2O$	*P* ī *a* / Å = 8.385(5) *b* / Å = 9.236(5) *c* / Å = 14.762(8) α /° = 87.640(10) β/° = 74.440(10) γ/° = 72.427(10) Z = 1			*J. Coord. Chem.,* **2011**, *64*, 2388
5.	*β* –(4–Hpya)$_2$[(4–Hpya)$_2$(H$_2$O)$_4$Mn][H$_6$CrMo$_6$O$_{24}$]{[(4–Hpya)(H$_2$O)$_3$Mn]$_2$(H$_6$CrMo$_6$O$_{24}$)}.12H$_2$O	*P* ī *a* / Å = 14.275(2) *b* / Å = 14.3852(2) *c* / Å = 15.755(2) α /° = 115.364(7) β/° = 93.342(9) γ/° = 112.530(7) Z = 1			*CrystEngComm,* **2011**, *13*, 5384

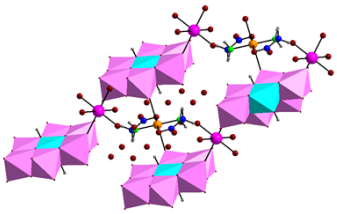
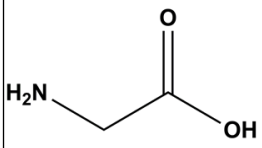
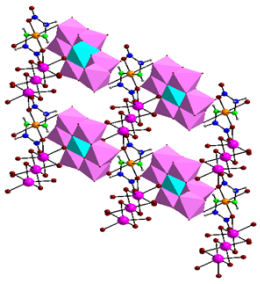
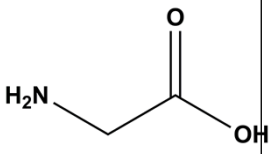
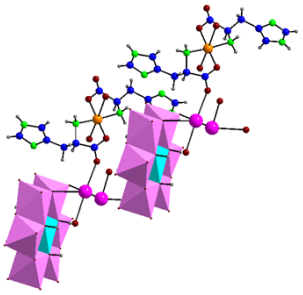
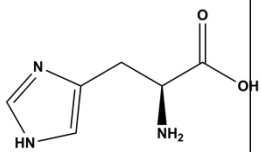
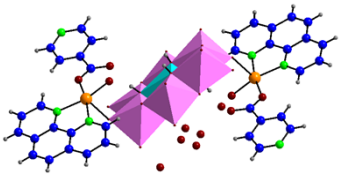
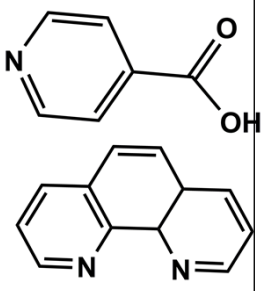
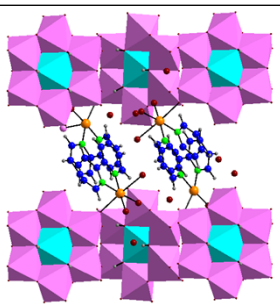
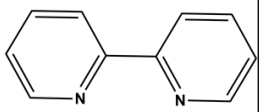
6.	α –(4–Hpya)$_2${[(4–Hpya)$_2$(H$_2$O)$_3$Mn]$_2$[(H$_2$O)$_4$Mn(H$_6$CrMo$_6$O$_{24}$)$_2$]}.12H$_2$O	$P2_1/c$ a / Å = 10.265(7) b / Å = 15.819(9) c / Å = 32.146(2) α /° = 90.00 β/° = 96.754(4) γ/° = 90.00 Z = 2			*CrystEngComm*, **2011**, *13*, 5384
7.	[(3–Hpya)$_2$Na][(3–Hpya)$_2$Mn(H$_2$O)$_2$][H$_6$CrMo$_6$O$_{24}$] .4H$_2$O	$P\bar{1}$ a / Å = 10.6700(6) b / Å = 10.9118(7) c / Å = 11.7075(7) α /° = 106.238(3) β/° = 94.151(3) γ/° = 91.344(3) Z = 1			*CrystEngComm*, **2011**, *13*, 5384
8.	{Mn(salen)$_2$(H$_2$O)$_2$[H$_6$CrMo$_6$O$_{24}$]}[arg].11H$_2$O	$P\bar{1}$ a / Å = 12.997(3) b / Å = 13.642(3) c / Å = 19.196(4) α /° = 101.88(3) β/° = 95.82(3) γ/° = 93.48(3) Z = 2			*Dalton Trans.*, **2011**, *40*, 56
9.	[{Cr$_3$O(CH$_3$COO)$_6$(H$_2$O)$_3$}$_2${H$_7$CrMo$_6$O$_{24}$}] .24H$_2$O	$P\bar{1}$ a / Å = 10.134(14) b / Å = 14.688(2) c / Å = 15.442(2) α /° = 108.076(2) β/° = 93.539(2) γ/° = 92.825(2) Z = 1			*Aust. J. Chem.*, **2011**, *64*, 68
10.	[{Cu$_2$(*ox*)(*pz*)$_4$}{H$_7$CrMo$_6$O$_{24}$}].11H$_2$O	$P\bar{1}$ a / Å = 9.246(3) b / Å = 11.590(3) c / Å = 12.880(4) α /° = 78.061(5) β/° = 80.244(5) γ/° = 85.038(5) Z = 1			*Aust. J. Chem.*, **2011**, *64*, 68

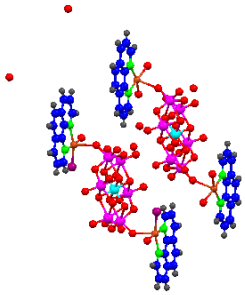
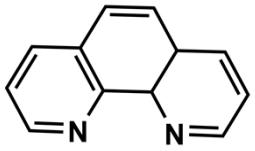
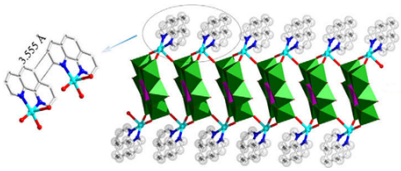
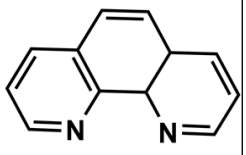
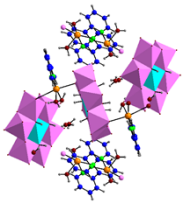
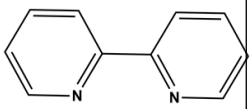
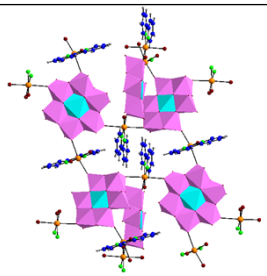
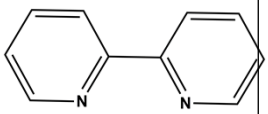
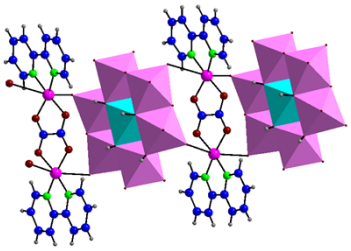
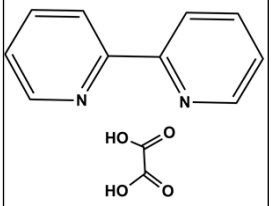
11.	[{Cu(*pz*)$_2$(H$_2$O)$_2$}{Cu$_2$(*ox*)(*pz*)$_4$}{H$_5$CrMo$_6$O$_{24}$}] .8H$_2$O	*P* ī *a* / Å = 9.236(7) *b* / Å = 11.675(9) *c* / Å = 12.352(9) α /° = 93.103(15) β/° = 98.542(17) γ/° = 94.712(15) Z = 1			*Aust. J. Chem.* **2011**, *64*, 68
12.	[{Cu(*pz*)$_3$Cl}{Cu$_2$(*ox*)(*pz*)$_4$}{H$_6$CrMo$_6$O$_{24}$}].8H$_2$O	*P* 2/*n* *a* / Å = 13.396(3) *b* / Å = 11.557(3) *c* / Å = 18.981(5) α /° = 90.00 β/° = 97.367(5) γ/° = 90.00 Z = 2			*Aust. J. Chem.* **2011**, *64*, 68
13.	(H$_2$4–*pyc*)$_2$[{Na–(4–*pyc*)$_2$}{H$_8$CrMo$_6$O$_{24}$}] . 4H$_2$O	*P* ī *a* / Å = 10.514(5) *b* / Å = 10.655(5) *c* / Å = 12.295(6) α /° = 97.351(9) β/° = 112.286(8) γ/° = 113.523(8) Z = 1			*Cryst. Growth Des.* **2011** , *11*, 3381
14.	(H$_2$4–*pyc*)$_2$[{Ni(4–*pyc*)$_2$(H$_2$O)$_4$}{H$_7$CrMo$_6$O$_{24}$}] .12H$_2$O,	*P* ī *a* / Å = 10.599(12) *b* / Å = 11.843(14) *c* / Å = 13.142(16) α /° = 102.36(2) β/° = 111.815(3) γ/° = 107.759(2) Z = 1			*Cryst. Growth Des.* **2011** , *11*, 3381
15.	(H$_2$4–*pyc*)$_2$[{Cu(4–*pyc*)$_2$(H$_2$O)$_4$}{ H$_7$CrMo$_6$O$_{24}$}] .10H$_2$O	*P* ī *a* / Å = 10.559(4) *b* / Å = 11.819(4) *c* / Å = 13.105(5) α /° = 102.202(6) β/° = 111.925(5) γ/° = 107.706(6) Z = 1			*Cryst. Growth Des.* **2011**, *11*, 3381

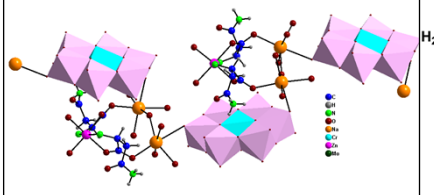
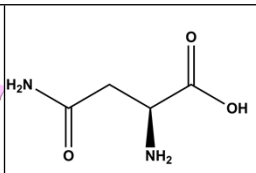
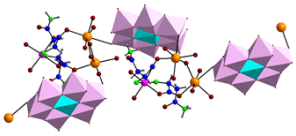
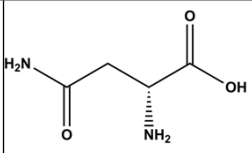
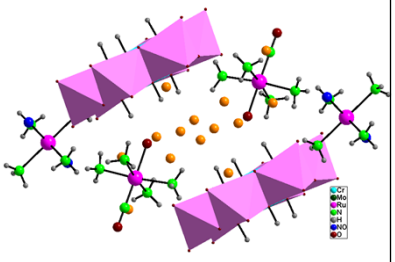
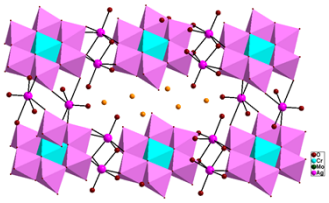
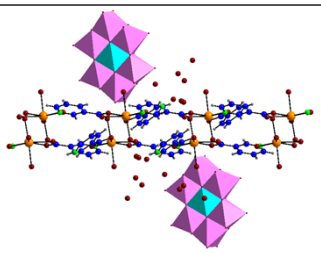
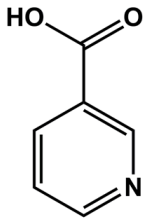
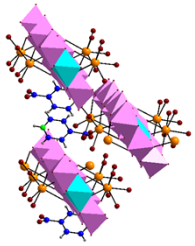
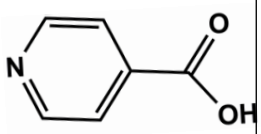
16.	$(H_2$3–*pyc*$)_2[\{Na($3–*pyc*$)_2\}\{H_8CrMo_6O_{24}\}]. 2H_2O$	*C*2/*c* *a* / Å = 22.084(3) *b* / Å = 9.4366(11) *c* / Å = 21.011(3) α /° = 90.00 β/° = 98.517(2) γ/° = 90.00 Z = 4			*Cryst. Growth Des.* **2011**, *11*, 3381
17.	$[\{Cu_2(2–pzc)_2(H_2O)_4\}\{H_7CrMo_6O_{24}\}].17H_2O$	*P*2$_1$/*c* *a* / Å = 10.880(17) *b* / Å = 17.084(3) *c* / Å = 13.590(2) α /° = 90.00 β/° = 107.703(3) γ/° = 90.00 Z = 2			*Cryst. Growth Des.* **2011**, *11*, 3381
18.	(H*pyz*)$[\{Co(pyz)_2(H_2O)_2\}\{H_6CrMo_6O_{24}\}].2H_2O$	*P* ī *a* / Å = 8.1452(11) *b* / Å = 10.5171(15) *c* / Å = 11.6507(16) α /° = 101.448(2) β/° = 98.692(3) γ/° = 110.586(2) Z = 1			*Cryst. Growth Des.* **2010**, *10*, 5105
19.	(H*pyz*)$[\{Zn(pyz)_2(H_2O)_2\}\{H_6CrMo_6O_{24}\}].2H_2O$	*P* ī *a* / Å = 8.161(2) *b* / Å = 10.483(3) *c* / Å = 11.595(3) α /° = 101.791(4) β/° = 98.159(3) γ/° = 110.274(4) Z = 1			*Cryst. Growth Des.* **2010**, *10*, 5105
20.	(H*pyz*)$[\{Ni(pyz)_2(H_2O)_2\}\{H_6CrMo_6O_{24}\}].2H_2O$	*P* ī *a* / Å = 8.119(3) *b* / Å = 10.480(3) *c* / Å = 11.544(4) α /° = 101.758(5) β/° = 98.320(6) γ/° = 110.541(6) Z = 1			*Cryst. Growth Des.* **2010**, *10*, 5105

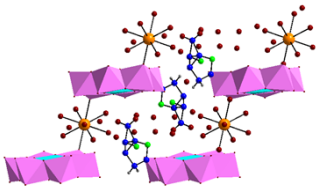
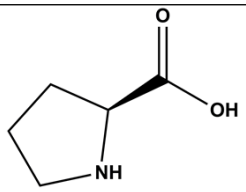
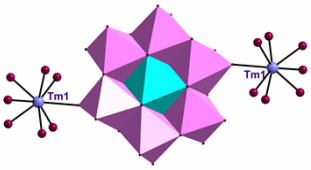
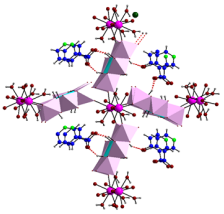
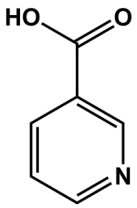
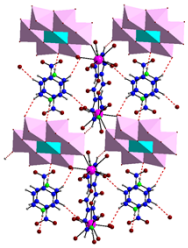
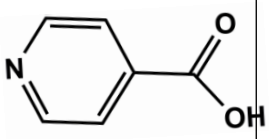
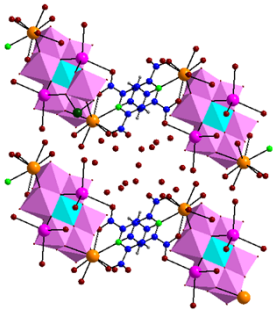
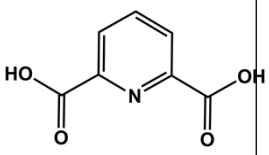
21.	[{Ni(*pyz*)$(H_2O)_4$}$_2${$H_6CrMo_6O_{24}$}]$(CH_3COO)_2.6H_2O$	*Cmca* *a* / Å = 23.821(5) *b* / Å = 14.004(3) *c* / Å = 13.420(3) Z = 4			*Cryst. Growth Des.*, **2010**, *10*, 5105
22.	[Na($H_8CrMo_6O_{24}$)].$10H_2O$	*P* ī *a* / Å = 6.459(8) *b* / Å = 10.902(13) *c* / Å = 10.917(13) α /° = 108.95(2) β/° = 106.590(4) γ/° = 95.778(2) Z = 1		–	*Cryst. Growth Des.*, **2010**, *10*, 5105
23.	[RuNO$(en)_2Cl]_3$[$H_6CrMo_6O_{24}$].$17H_2O$	*P* ī *a* / Å = 7.994(0) *b* / Å = 12.898(0) *c* / Å = 22.499(1) α /° = 79.65(0) β/° = 81.46(0) γ/° = 87.53(0) Z = 1			*Inorg.Chim. Acta*, **2009** ,*362*,2279
24.	$(BEDT–TTF)_4$[$H_6CrMo_6O_{24}$] ·$2H_2O$	*P* ī *a* / Å = 5.954(2) *b* / Å = 16.376(6) *c* / Å = 21.864(6) α /° = 110.829(2) β/° = 91.262(2) γ/° = 98.129(1) Z = 1			*J. Cluster Sci.*, **2003**, *14*, 193.
25.	[{$Na_3(H_2O)_{11}$}{$H_6CrMo_6O_{24}$}].$2H_2O$	*P* ī *a* / Å = 10.968 (2) *b* / Å = 11.686 (2) *c* / Å = 14.895 (3) α /° = 72.10 (3) β/° = 70.99 (3) γ/° = 66.90 (3) Z = 2		–	*Acta Cryst. E.*, **2006**, *62*, i190.
26.	$(C_6NO_2H_6)_2$[$(C_6NO_2H_5)_2$Ag] [$H_6CrMo_6O_{24}$].$4H_2O$	*P* ī *a* / Å = 10.458(2) *b* / Å = 10.644(2) *c* / Å = 12.295(3) α /° = 97.40(3) β/° = 112.38(3) γ/° = 113.59(3) Z = 1			*Inorg. Chem.*, **2005**, *44*, 6062

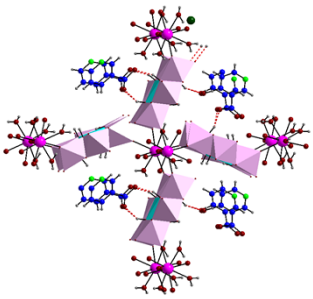
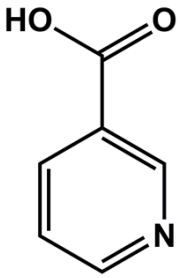
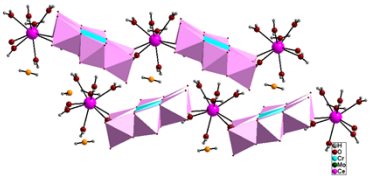
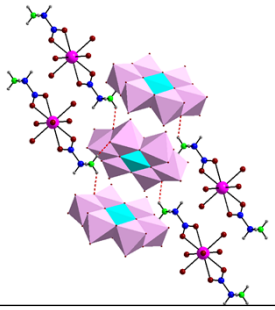
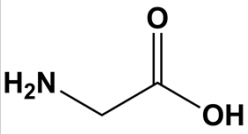
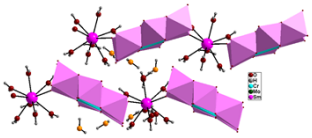
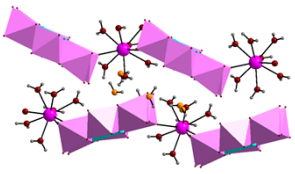
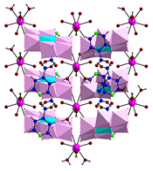
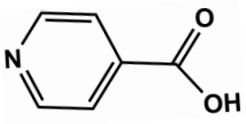
27.	$[Na_3\{H_6CrMo_6O_{24}\}].8H_2O$	*P* ī *a* / Å = 10.908 (4) *b* / Å = 10.980(4) *c* / Å = 6.467 (2) α /° = 107.594(2) β/° = 84.438(2) γ/° =112.465(3) Z = 1		–	*Inorg. Chem.*, **1970**, *9*, 2228.
28.	$[Na_3\{H_6CrMo_6O_{24}\}]$ .6DMSO	*C*2/*c* *a* / Å = 25.37(2) *b* / Å = 14.632(2) *c* / Å = 15.455(6) β/° = 123.17(4) Z = 4			*Inorg. Chem.*, **1998,** *37,* 1499.
29.	$(C_6H_5NO_2)_2[\{Na_3(C_6H_5NO_2)_2\}\{H_6CrMo_6O_{24}\}]$	*C*2/*c* *a* / Å = 22.045(4) *b* / Å = 9.464(19) *c* / Å = 21.088(4) β/° = 98.56(3) Z = 4			*J. Mol. Struct.*, **2005**, *751*, 184.
30.	$\{Fe(C_5H_5)_2\}_2$ $[Na\{H_6CrMo_6O_{24}\}.3H_2O$	*P*2$_1$/*n* *a* / Å = 10.015(2) *b* / Å = 7.722(6) *c* / Å = 25.137(5) β/° = 90.626(9) Z = 2			*Inorg. Chem.*, **1998,** *37,* 1499.
31.	$\{Fe(C_5Me_5)_2\}_3\{H_6CrMo_6O_{24}\}.20H_2O$	*P* ī *a* / Å = 12.489(3) *b* / Å = 14.113(3) *c* / Å = 15.662(4) α /° = 101.55(2) β/° = 105.82(2) γ/° = 110.23(2) Z = 1			*Inorg. Chem.*, **1998,** *37,* 1499.

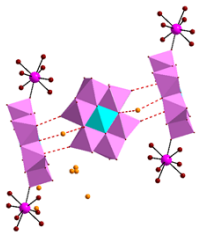
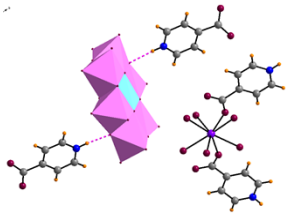
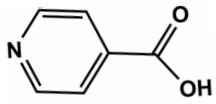
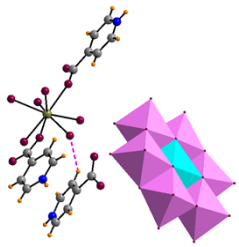
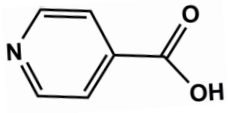
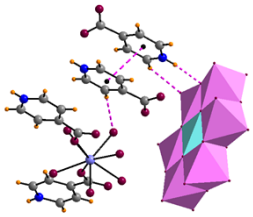
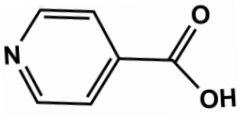
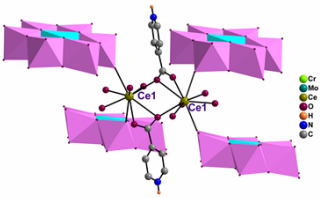
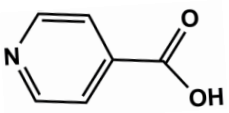
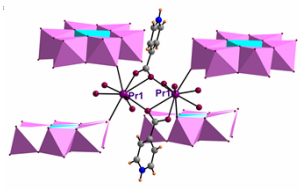
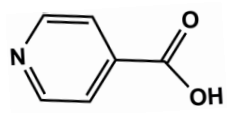
32.	[{Cu(Gly)$_2$}{Na(H$_2$O)$_4$ (H$_6$CrMo$_6$O$_{24}$)}].9.5H$_2$O	*P* ī *a* / Å = 10.684(2) *b* / Å = 10.960(2) *c* / Å = 10.979(2) α /° = 60.42(3) β/° = 63.10(3) γ/° = 78.87(3) Z = 1			*Inorg. Chem., Commun.* **2004**, *7*, 521.
33.	[Na$_3${Cu(Gly)$_2$} {H$_6$CrMo$_6$O$_{24}$}].13H$_2$O	*P* ī *a* / Å = 10.577(2) *b* / Å = 10.852(2) *c* / Å = 10.955(2) α /° = 60.31(3) β/° = 63.32(3) γ/° = 78.95(3) Z = 1			*J. Cluster Sci.*, **2008** *19*, 367.
34.	[{Cu(C$_6$H$_8$N$_3$O$_2$)(C$_6$H$_9$N$_3$O$_2$) (H$_2$O)$_2$}{Na(H$_2$O)}$_2$ {H$_6$CrMo$_6$O$_{24}$}].3H$_2$O	*P*1 *a* / Å = 10.205(16) *b* / Å = 11.209(18) *c* / Å = 11.804(19) α /° = 109.583(2) β/° = 95.353(2) γ/° = 109.081(2) Z = 1			*J. Mol. Struct.*, **2009**, *931*, 50.
35.	[{Cu(4–*pyc*(phen)(H$_2$O)}$_2$ {H$_6$CrMo$_6$O$_{24}$}](H$_3$O$^+$) .5H$_2$O	*P* ī *a* / Å = 9.941(9) *b* / Å = 9.945(9) *c* / Å = 14.249(12) α / ° = 81.457(10) β/ ° = 83.014(10) γ/ ° = 77.224(10) Z = 1			*J. Mol. Struct.*, **2009**, *920*, 284.
36.	[{Cu(2,2'–bpy)(H$_2$O)$_3$}$_2$ {H$_6$CrMo$_6$O$_{24}$}] [{Cu(2,2'–bpy) (H$_2$O)Cl} {Cu(2,2'–bpy)(H$_2$O)(NO$_3$)}{H$_6$CrMo$_6$ O$_{24}$}].18H$_2$O	*P* ī *a* / Å = 13.252(3) *b* / Å = 13.791(3) *c* / Å = 14.277(3) α /° = 90.71(3) β/° = 108.34(3) γ/° = 90.40(3) Z = 1			*J. Solid State Chem.*, **2009**, *182*, 49.

37.	[{(Cu(phen)(H_2O)$_2$)$_2$($H_6CrMo_6O_{24}$)}{(Cu(phen)(H_2O)Cl($H_6CrMo_6O_{24}$)$_2$}]. 5H_2O	*P* ī *a* / Å = 10.886(5) *b* / Å = 15.250(7) *c* / Å = 15.702 (7) α /° = 64.985(10) β/° = 83.043(10) γ/° = 71.157(10) Z = 1			*Inorg. Chem.* ,**2005**, *44*, 8846.
38.	[{Cu(phen)}$_2${$H_5CrMo_6O_{24}$}]	*P*2$_1$/*n* *a* / Å = 5.6671(10) *b* / Å = 21.372(5) *c* / Å = 14.709(3) β/° = 98.10(10) Z = 2			*J. Mol. Struct.*, **2010**, *967*, 15.
39.	[Cu(2,2'–bpy)(H_2O)$_2$Cl] [{Cu(2,2'–bpy)(H_2O)$_2$}{$H_6CrMo_6O_{24}$}]. 4H_2O	*P* ī *a* / Å = 11.244(2) *b* / Å = 14.566(3) *c* / Å = 15.330(3) α /° = 112.21(3) β/° = 106.65(3) γ/° = 93.90(3) Z = 2			*J. Solid State Chem.*, **2009**, *182*, 49.
40.	(H_3O)[{Cu(2,2'–bpy)(H_2O)$_2$}$_2$ {Cu(2,2'–bpy)(H_2O)}$_2$ {$H_6CrMo_6O_{24}$}]$_3$ .36H_2O	*P* ī *a* / Å = 14.189(13) *b* / Å = 15.676(14) *c* / Å = 16.226(15) α /° = 65.478(10) β/° = 70.512(10) γ/° = 80.586(10) Z = 1			*J. Solid State Chem.*, **2009**, *182*, 49.
41.	[{Cu_2(bpy)$_2$(μ–ox)}{$H_7CrMo_6O_{24}$}]	*Pna*2 *a* / Å = 14.238(7) *b* / Å = 26.331(13) *c* / Å = 10.282(5) Z = 4			*Inorg. Chem.* ,**2007**, *46*, 3541.

42.	$(C_4NH_7O_4)[\{(Zn\ (L–C_4H_8N_2O_3)_2)(Na_2(H_2O)_9)\}_2\{H_6CrMo_6O_{24}\}_2].7H_2O$	*P* 2_12_12 *a* / Å = 20.405(4) *b* / Å = 21.821(4) *c* / Å = 10.917(2) Z = 4			*Inorg. Chem. Commun.*, **2008**, *11*, 914.
43.	$(C_4NH_7O_4)[\{(Zn(D–C_4H_8N_2O_3)_2)(Na_2(H_2O)_9)\}_2\{H_6CrMo_6O_{24}\}_2].7H_2O$	*P* 2_12_12 *a* / Å = 20.454(4) *b* / Å = 21.822(4) *c* / Å = 10.918(2) Z = 4			*Inorg. Chem. Commun.* , **2008**, *11*, 914.
44.	$\{RuNO(NH_3)_4OH\}_3[\{H_6CrMo_6O_{24}\}_2].15H_2O$	*P* ī *a* / Å = 10.585(2) *b* / Å = 11.040(2) *c* / Å = 16.807(4) α /° = 76.919(1) β/° = 73.774(1) γ/° = 84.090(1) Z = 1		–	*J. Cluster Sci.*, **2006**, *17*, 303.
45.	$[\{Ag_3(H_2O)_4\}\{H_6CrMo_6O_{24}\}].3H_2O$	*P* ī *a* / Å = 6.205(12) *b* / Å = 14.185(3) *c* / Å = 15.077(3) α /° = 90.68(3) β/° = 90.08(3) γ/° = 93.82(3) Z = 2		–	*Cryst. Growth Des.*, **2006**, *6*, 1107.
46.	$[\{(H_2O)_2(HC_6H_4NO_2)Cd(C_6H_5NO_2)\}_2\{H_6CrMo_6O_{24}\}].9H_2O$	*P* ī *a* / Å = 7.992(16) *b* / Å = 13.861(3) *c* / Å = 14.357(3) α /° = 74.63(3) β/° = 84.59(3) γ/° = 82.96(3) Z = 1			*J. Mol. Struct.*, **2009**, *933*, 86.
47.	$[\{Cd_3(H_2O)_{14}\}\{H_6CrMo_6O_{24}\}_2]\ (C_6H_5NO_2)_4$	*Pc* *a* / Å = 12.639(3) *b* / Å = 10.761(2) *c* / Å = 13.777(3) β/° = 104.29(3) Z = 1			*J. Mol. Struct.*, **2009**, *933*, 86.

48.	$(C_5H_9NO_2)_2[La(H_2O)_7\{H_6CrMo_6O_{24}\}].11H_2O$	*C*2/*c* *a* / Å = 26.257(5) *b* / Å = 11.526(2) *c* / Å = 19.890(4) β/° = 127.44(3) Z = 4			*Inorg. Chem. Commun.* **2004**, *7*, 356.
49.	$[Tm_2(H_2O)_{14}H_6CrMo_6O_{24}][H_6CrMo_6O_{24}].16H_2O$	*P* ī *a* / Å = 11.098(13) *b* / Å = 11.720(14) *c* / Å = 13.984(16) α /° = 74.993(2) β/° = 84.548(2) γ/° = 89.545(2) Z = 1		–	*CrystEngComm*, **2008**, 10, 1318
50.	$(3\text{–}pyc)_2[La(H_2O)_5\{H_6CrMo_6O_{24}\}].0.5H_2O$	*Pmn*2$_1$ *a* / Å = 15.080(3) *b* / Å = 11.630(2) *c* / Å = 23.096(5) Z = 4			*Eur. J. Inorg. Chem.*, **2005**, 854.
51.	$(4\text{–}pyc)[\{La(4\text{–}pyc)(H_2O)_7\}\{H_6CrMo_6O_{24}\}].10.5H_2O$	*P* ī *a* / Å = 11.071(2) *b* / Å = 13.252(3) *c* / Å = 17.318(4) α /° = 91.73(3) β/° = 93.94(3) γ/° = 94.46(3) Z = 2			*J. Mol. Struct.*, **2005**, *743*, 117.
52.	$Na[\{Ce(dipic)(H_2O)_3\}_2\{H_6CrMo_6O_{24}\}].13H_2O$	*P* ī *a* / Å = 9.215(18) *b* / Å = 12.140(2) *c* / Å = 13.707(3) α /° = 70.99(3) β/° = 75.04(3) γ/° = 72.22(3) Z = 1			*Trans. Metal Chem.*, **2006**, *31*, 770.

53.	(3–*pyc*)$_2$[Ce(H$_2$O)$_5$ {H$_6$CrMo$_6$O$_{24}$}]. 0.5H$_2$O	*Pmn*2$_1$ *a* / Å = 15.031(9) *b* / Å = 11.609(7) *c* / Å = 23.048(14) Z = 4			*Eur. J. Inorg. Chem.*, **2005**, 854.
54.	[Ce(H$_2$O)$_7${H$_6$CrMo$_6$O$_{24}$}]. 4H$_2$O	*Pca*2 *a* /Å = 11.861(3) *b* / Å = 11.003 (3) *c* / Å = 22.611 (6) Z = 4		–	*Z. Anorg. Allg. Chem.*, **2008**, 758.
55.	[{Nd(C$_2$H$_5$NO$_2$)$_2$(H$_2$O)$_5$} {H$_6$CrMo$_6$O$_{24}$}].10H$_2$O	*C*2/*c* *a* / Å = 33.202(7) *b* / Å = 10.733(2) *c* / Å = 11.910(2) β/° = 106.38(3) Z = 4			*J. Mol. Struct.*, **2005**, *743*, 117.
56.	[Sm(H$_2$O)$_7${H$_6$CrMo$_6$O$_{24}$}]. 4H$_2$O	*Pca*2 *a* / Å = 11.828(4) *b* / Å = 10.969(4) *c* / Å = 22.437(7) Z = 4		–	*Z. Anorg. Allg. Chem.* ,**2008**, 758.
57.	[Eu(H$_2$O)$_7${ H$_6$CrMo$_6$O$_{24}$}]· 4H$_2$O	*Pca*2 *a* / Å = 11.832(5) *b* / Å = 10.966(5) *c* / Å = 22.425(5) Z = 4		–	*Z. Anorg. Allg. Chem.*, **2008**, 758.
58.	(C$_6$H$_5$NO$_2$)$_2$[Dy(H$_2$O)$_6$ {H$_6$CrMo$_6$O$_{24}$}].4H$_2$O	*C*2/*c* *a* / Å = 18.276(4) *b* / Å = 12.549(3) *c* / Å = 17.822(4) β/° = 103.90(3) Z = 4			*J. Mol. Struct.*, **2005**, *751*, 184.

59.	$[\{Er_2(H_2O)_{14}(H_6CrMo_6O_{24})\}\{H_6CrMo_6O_{24}\}].14H_2O$	*P* ī *a* / Å = 11.046 (5) *b* / Å = 11.653 (5) *c* / Å = 13.935 (5) α /° = 75.006 (5) β/° = 84.497(5) γ/° = 89.515(5) Z = 1		–	*J. Chem. Crystallogr.*, **2008**, *38*, 695.
60.	$[(C_6H_5NO_2)_2Er(H_2O)_6](H_6CrMo_6O_{24})\cdot 2C_6H_5NO_2\cdot 6H_2O$	*P* ī *a* / Å = 12.797(5) *b* / Å = 12.927(5) *c* / Å = 18.190(7) α /° = 93.43(0)° β/° = 105.63(0) γ /° = 113.06(0) Z = 2			*J. Coord. Chem.* **2013**, *66*, 1058,
61.	$[(C_6H_5NO_2)_2Dy(H_2O)_6](H_6CrMo_6O_{24})\cdot 2C_6H_5NO_2\cdot 6H_2O$	*P* ī *a* / Å = 12.786(4) *b* / Å = 12.892(4) *c* / Å = 18.1606(3) α /° = 93.4270(3) β/° = 105.60 γ /° = 112.76 Z = 2			*J. Coord. Chem.*, **2013**, *66*, 1058
62.	$[(C_6H_5NO_2)_2Sm(H_2O)_6](H_6CrMo_6O_{24})\cdot 2C_6H_5NO_2\cdot 6H_2O$	*P* ī *a* / Å = 12.789(4) *b* / Å = 12.916(4) *c* / Å = 18.158(5) α /° = 93.46(3) β/° = 105.61(3) γ /° = 113.06(3) Z = 2			*J. Coord. Chem.*, **2013**, *66*, 1058
63.	$(C_6NO_2H_5)[(H_2O)_4(C_6NO_2H_5)Ce(H_6CrMo_6O_{24})]\cdot 4H_2O$	*C*2/*c* *a* / Å = 23.616(5) *b* / Å = 13.384(3) *c* / Å = 24.746(5) β/° = 103.06(3) Z = 8			*New J. Chem.*, **2005**, *29*, 667
64.	$(C_6NO_2H_5)[(H_2O)_4(C_6NO_2H_5)Pr(H_6CrMo_6O_{24})]\cdot 4H_2O$	*C*2/*c* *a* / Å = 23.624(5) *b* / Å = 13.366(3) *c* / Å = 24.727(5) β/° = 103.06(3) Z = 8			*New J. Chem.*, **2005**, *29*, 667

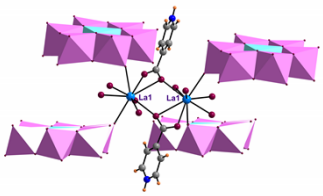
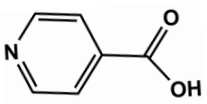
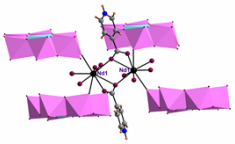
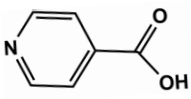
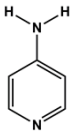
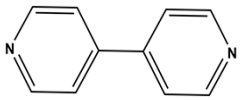
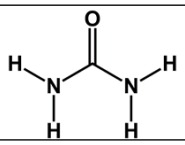
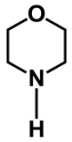
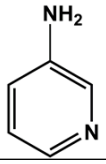
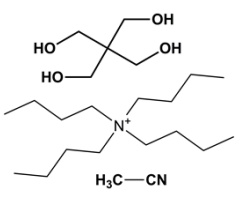
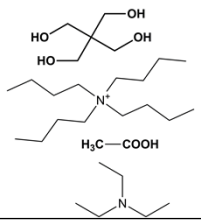
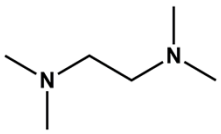
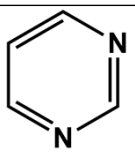
65.	$(C_6NO_2H_5)[(H_2O)_4(C_6NO_2H_5)La(H_6CrMo_6O_{24})]\ .4H_2O$	*C*2/*c* *a* / Å = 23.772(5) *b* / Å = 13.440(3) *c* / Å = 24.754(5) β/° = 103.10(3) Z = 8			*New J. Chem.*, **2005**, *29*, 667
66.	$(C_6NO_2H_5)[(H_2O)_4(C_6NO_2H_5)Nd(H_6CrMo_6O_{24})]\ .4H_2O$	*C*2/*c* *a* / Å = 23.564(5) *b* / Å = 13.388(3) *c* / Å = 24.787(5) β/° = 103.00(3) Z = 8			*New J. Chem.*, **2005**, *29*, 667

Table S2. Chromium molybdate cluster and organic based salts

S. No.	Composition	Organic	N−H···O [d (Å)]	Reference
1	$(C_5H_7N_2)_2\{H_7CrMo_6O_{24}\}.2H_2O$		2.096 2.152 2.195	*Z. Kristallogr.New Cryst. Struct.*, **2011** , *226*, 387
2	$(C_{10}H_{10}N_2)\{H_7CrMo_6O_{24}\}.3H_2O$		1.865	*Z. Kristallogr.New Cryst. Struct.*, **2011** , *226*, 387
3	$\{(N_2H_5CO)[(CH_3)_3N(CH_2)_2OH]_2\}[H_6CrMo_6O_{24}].4H_2O$		2.032	*Inorg. Chim. Acta*, **2010**, *363*, 1556
4	$(C_4H_{10}NO)_3[H_6CrMo_6O_{24}]\cdot 4H_2O$		1.86 1.94 2.19 2.53	*Acta Cryst.*, **2011**, *E67*, m776
5	$(H_3O)[(3\text{–}C_5H_7N_2)_2(H_6CrMo_6O_{24})].3H_2O$		1.91 2.21 2.17	*J. Coord. Chem.*, **2011**, *64*, 2848
6	$[(C_4H_9)_4N]_5\{H_7[HOCH_2C(CH_2)_3(CrMo_6O_{24}]_2\}$		–	*Chem. Eur. J.*, **2011**, *17*, 12002

7	$[(C_4H_9)_4N]_3$ $[(C_2H_5)_3NH]$ $(CH_3CO_2H)Cl$ $\{H_3[(CrMo_6O_{24}(CH_2)_3\ CCH_2OH]\}$		–	*Chem. Eur. J.*, **2011**, *17*, 12002
8	$\{(H$*temed*$)_3\}[\{H_6CrMo_6O_{24}\}_2].16H_2O$		1.878 2.721 2.692	*Proc. Natl. Acad. Sci., India, Sect. A Phys. Sci.* **2014** (DOI 10.1007/s40010−014−0144−6)
9	$\{H$*pym*$\}_2[\{H_7CrMo_6O_{24}\}].2H_2O$		1.897 2.071	*Proc. Natl. Acad. Sci., India, Sect. A Phys. Sci.* **2014** (DOI 10.1007/s40010−014−0144−6)

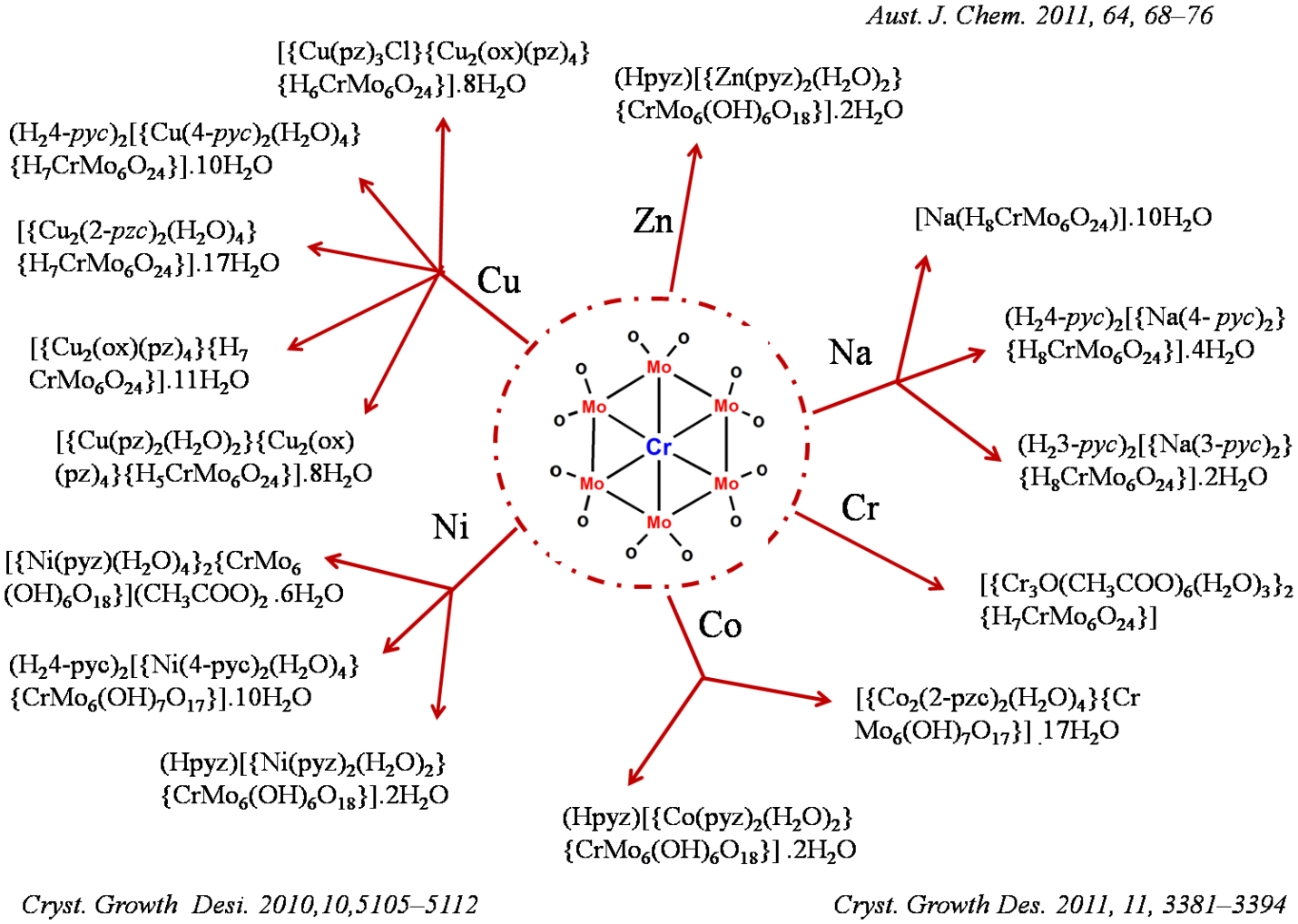


Fig. S1 Chromium molybdate cluster, $[H_mCrMo_6O_{24}]^{n-}$ based solids reported earlier from our lab.

Table S3. Structural classification of Ln–$[CrMo_6O_{24}]^{n-}$ system

Class	Composition	Structural Description	Reference
I	$[Ln(H_2O)_7\{CrMo_6(OH)_6O_{18}\}].4H_2O$ (Ln = Ce, Sm and Eu)	These solids forming 1-D chain between hydrated rare earth cation and cluster through the metal ligand coordination.	*Z. Anorg. Allg. Chem.* ,**2008**, 758.
II	$(C_6NO_2H_5)[(H_2O)_4(C_6NO_2H_5)Pr(H_6CrMo_6O_{24})] .4H_2O$ (Ln = La, Ce, Pr and Nd)	The structure is built of three main building blocks: A rare earth dimer bridged by a pair of 4–pyridine carboxylate, the chromium molybdate cluster and the zwitterionic 4–pyridine carboxylic acid.	*New J. Chem*., **2005**, *29*, 667
III	$(3\text{–}pyc)_2[Ce(H_2O)_5\{H_6CrMo_6O_{24}\}].0.5H_2O$ (Ln = La and Ce)	The structure of these having unique 3-D open framework constructed from chromium molybdate cluster building blocks and Ln^{3+} cations, with 3–pyridine carboxylic acid molecules and lattice water molecules residing in the channels.	*Eur. J. Inorg. Chem.,* **2005**, 854
IV	$[(C_6H_5NO_2)_2Ln(H_2O)_6] (H_6CrMo_6O_{24}).2C_6H_5NO_2.6H_2O$ (Ln = Sm, Dy and Er)	Single–crystal X–ray diffraction analysis reveals that these are made up of chromium molybdate cluster, lanthanum–4–pyridine carboxylic acid complexes as cations, discrete 4–pyridine carboxylic acid molecules and lattice water.	*J. Coord. Chem.,* **2013***, 66,* 1058

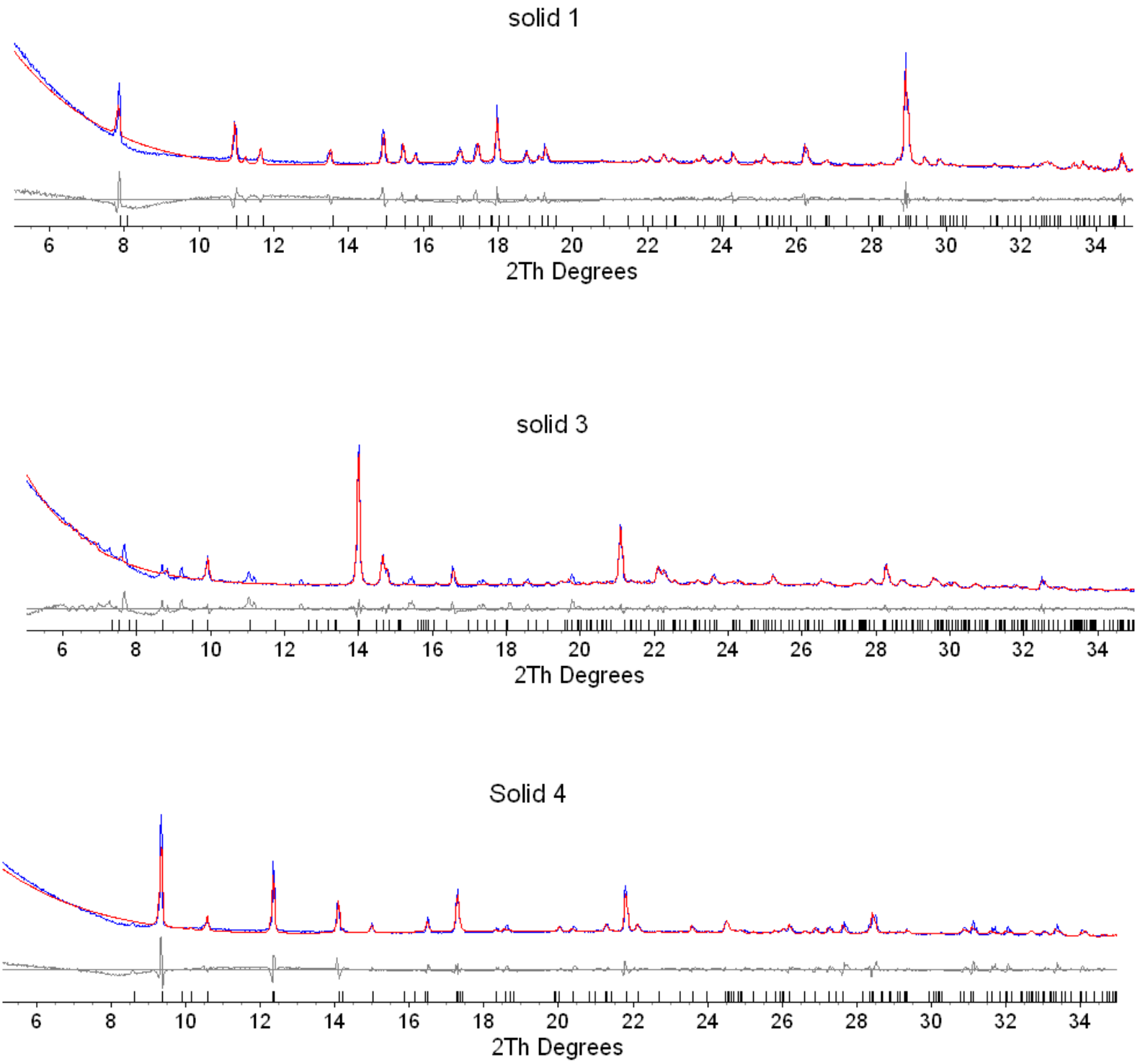


Fig. S2. Rietveld analysis of the powder diffraction data of **1**, **3** and **4**.

Red line – calculated intensity

Blue line – observed intensity

Grey line – difference ($I_{obs} - I_{calc}$)

Black bars – calculated Bragg reflections

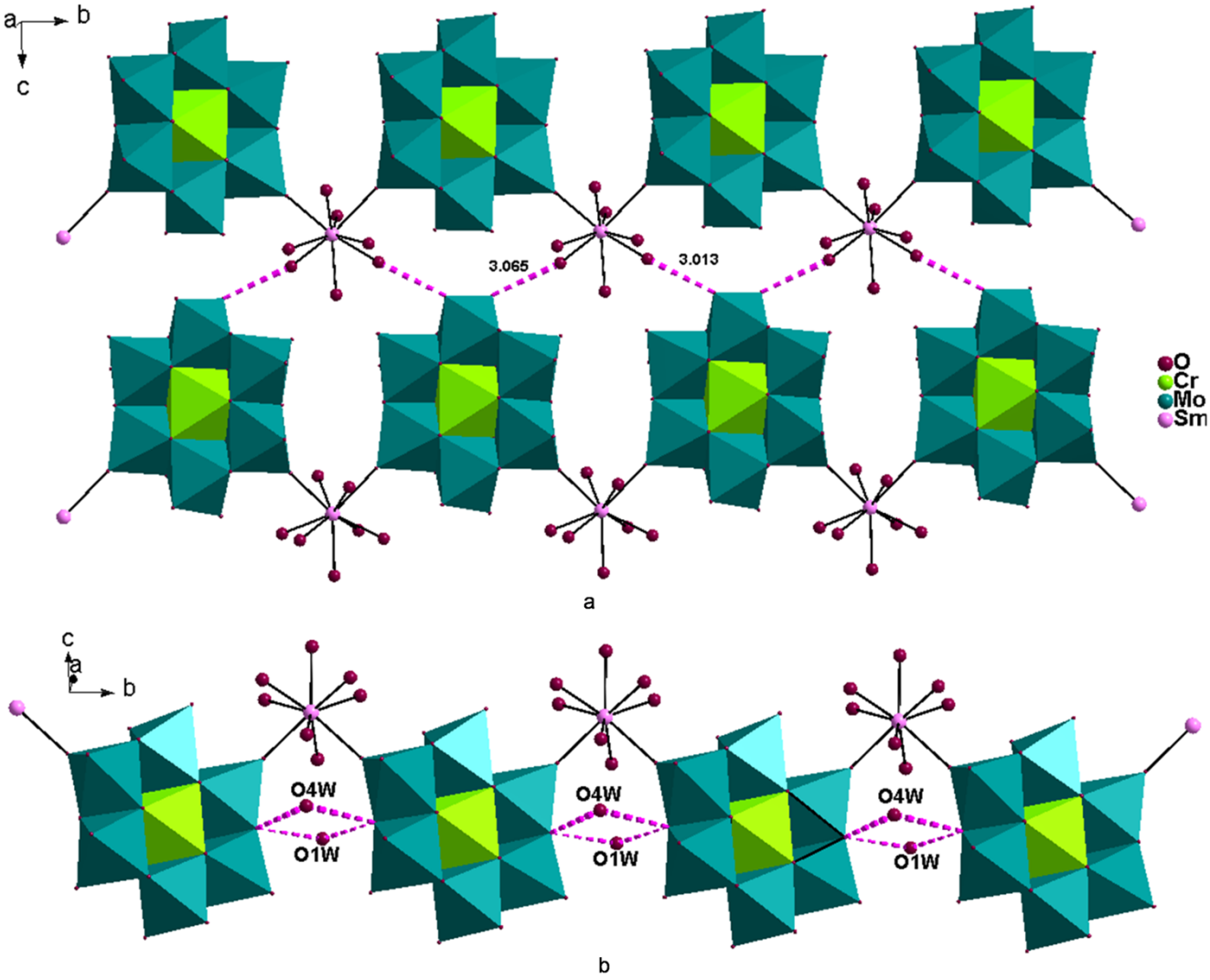


Fig. S3 (a) 2-D supramolecular sheet of **2** viewed along *bc* plane. Other atoms are omitted for clarity. (b) The 1-D chain incorporating a pair of water molecules through H–bonding.

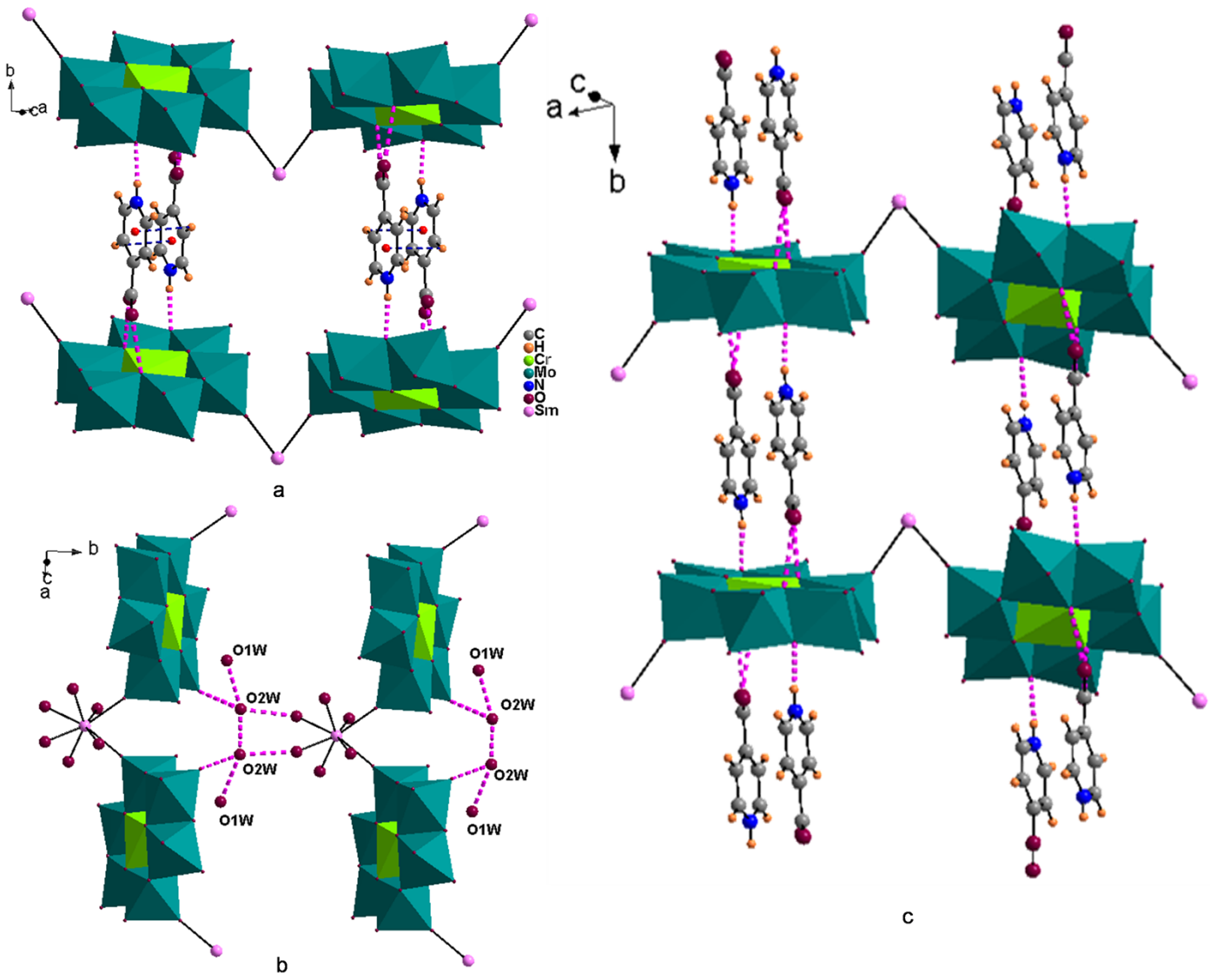


Fig. S4 (a) C–H···л interaction between two organic complex of solid **5**. (d) Two 1-D chain connected through the H–bonding with water molecules (c) 1-D chain connected through the organic cations through the H–bonding (N–H···Ot–Mo and O–H···O–C)

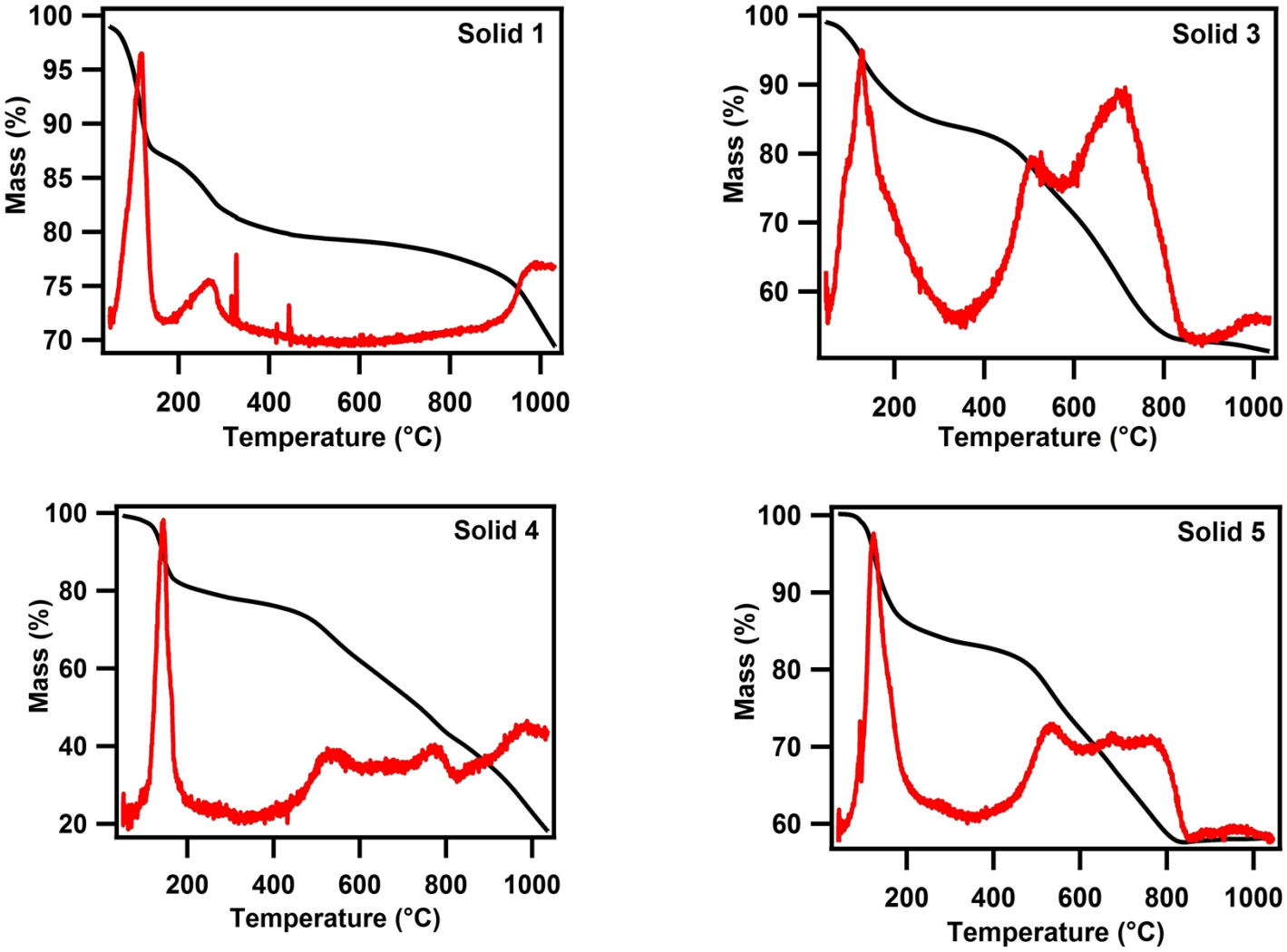
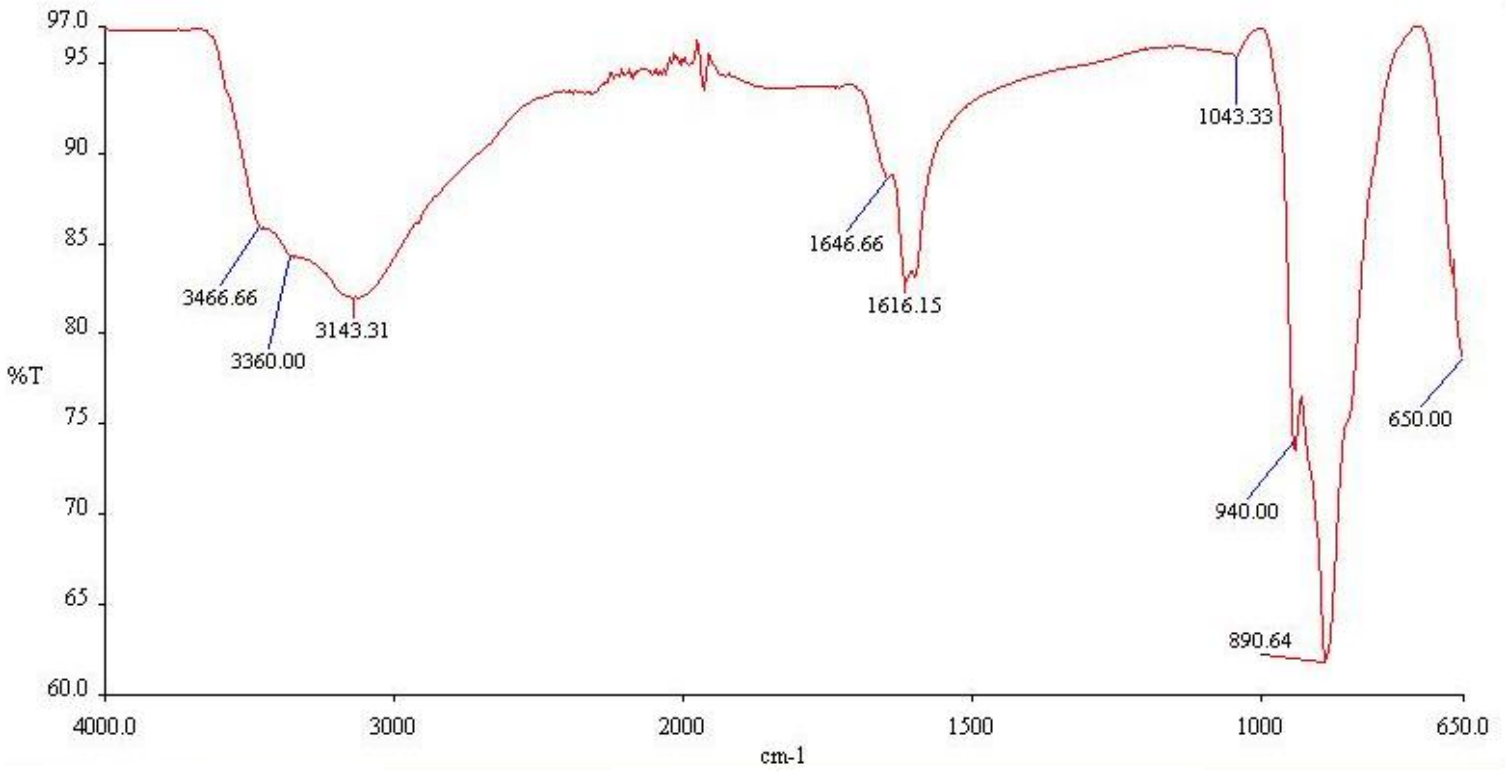
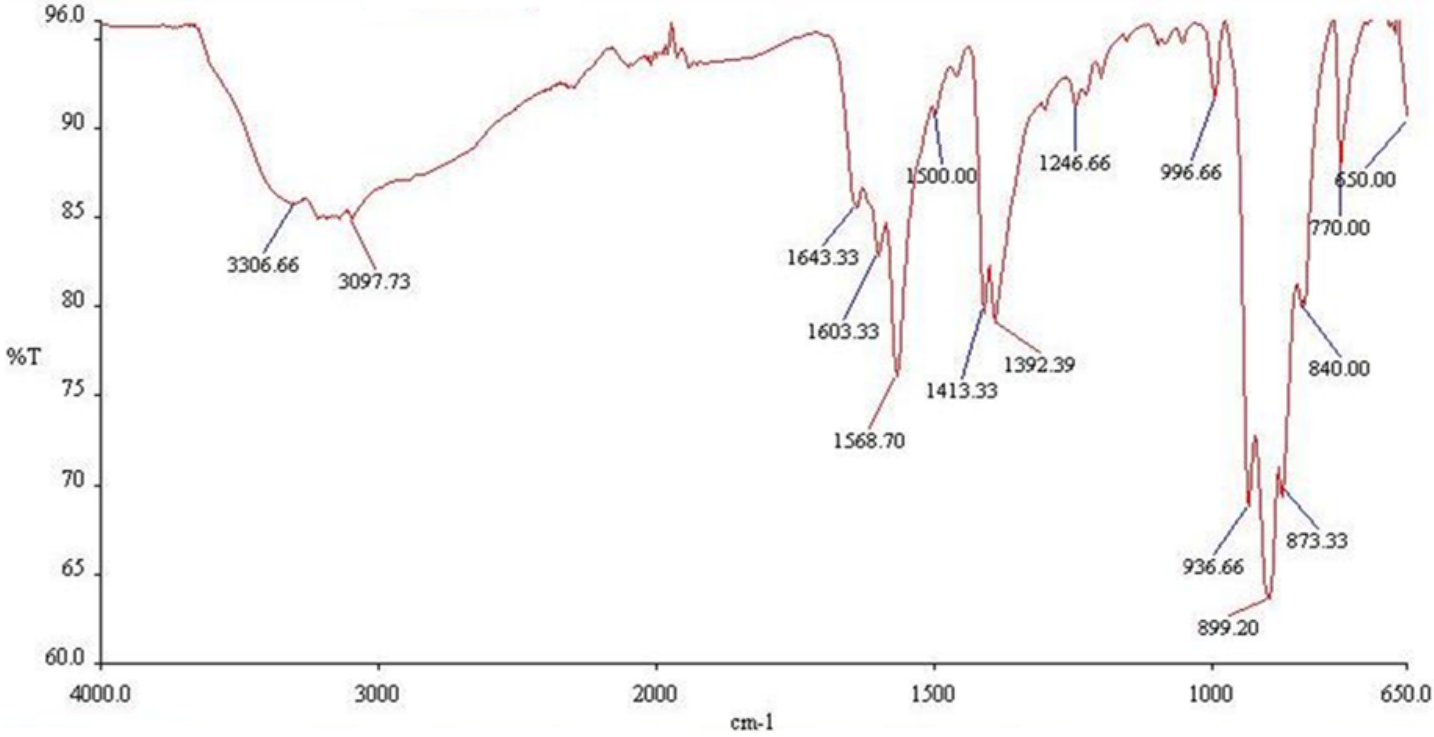


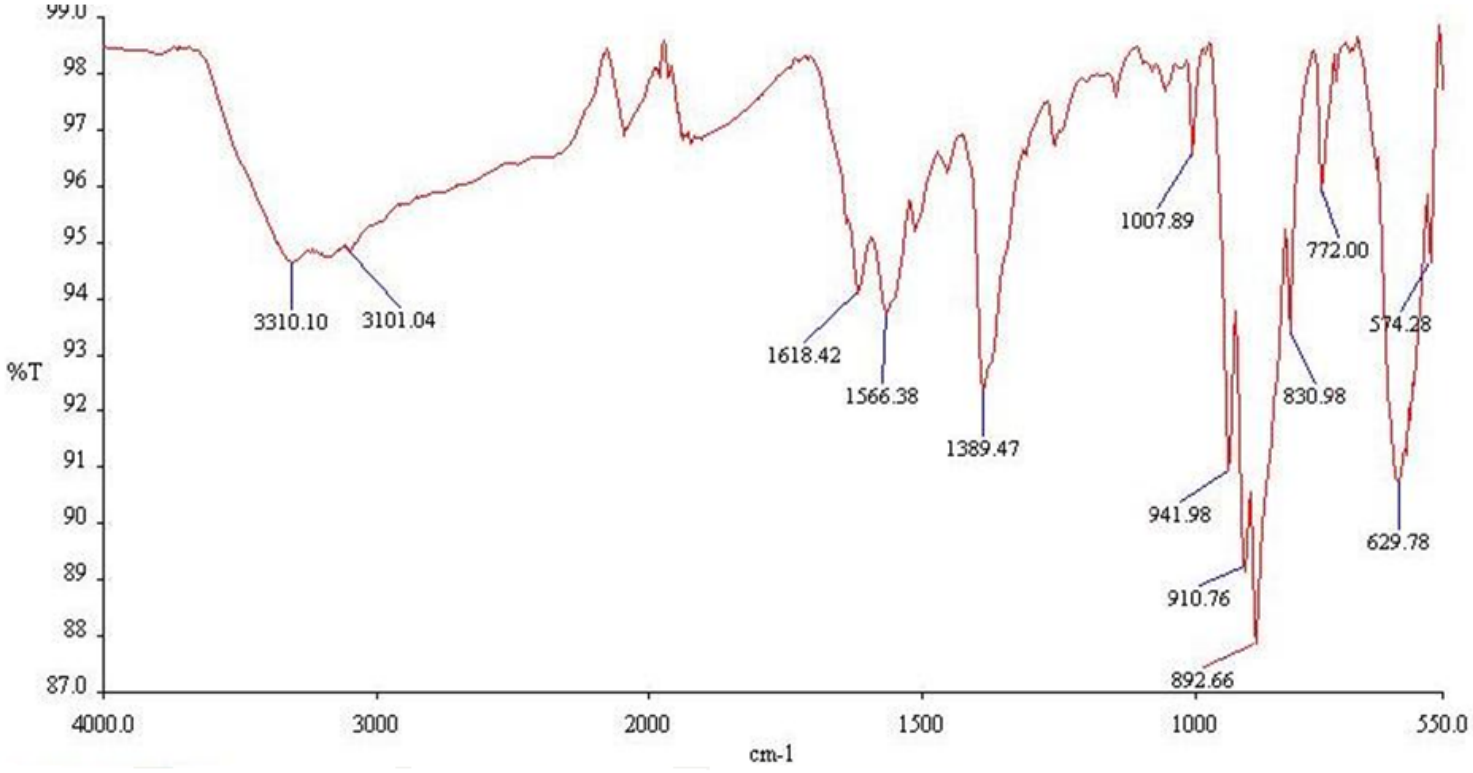
Fig. S5 TG/DT plots for solids **1, 3, 4** and **5** in nitrogen atmosphere.



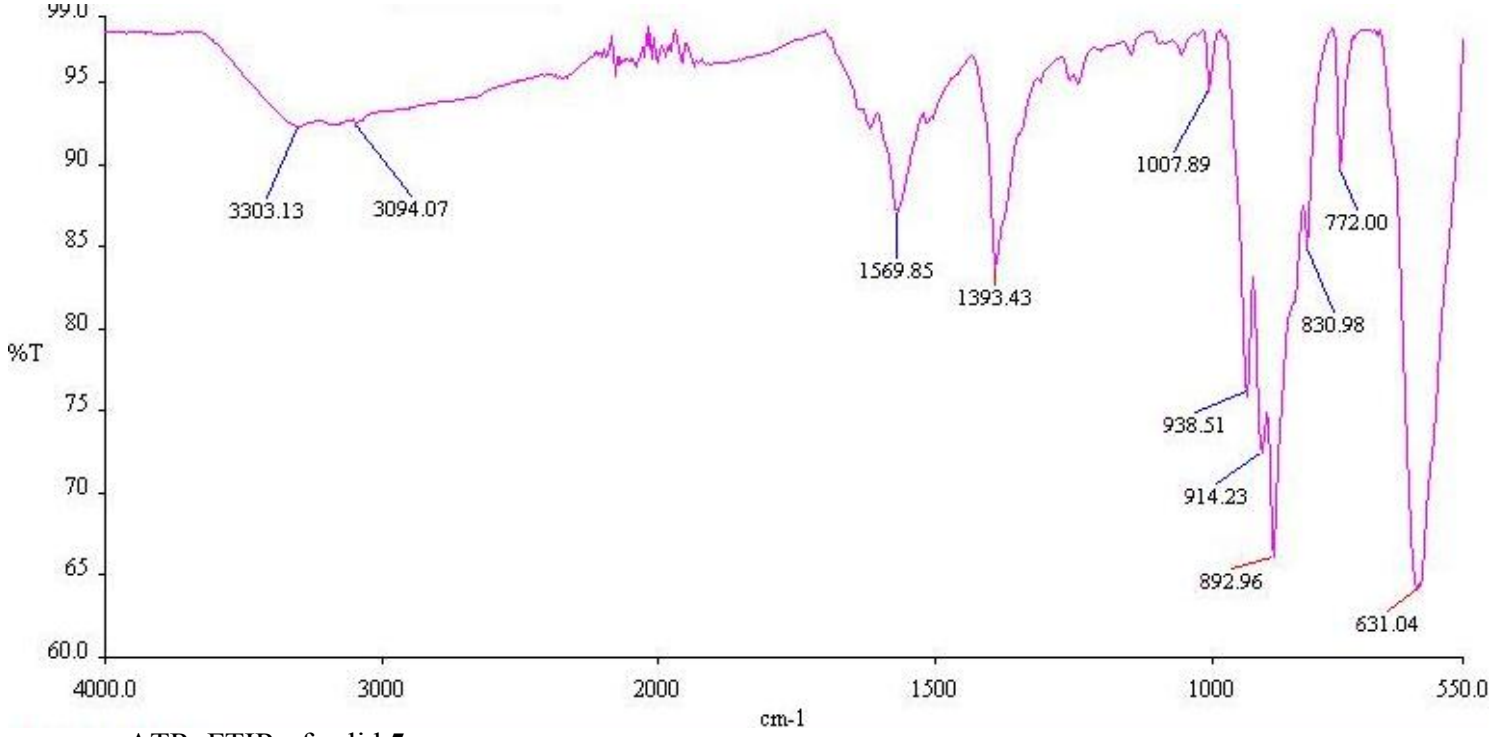
ATR–FTIR of solid **1**



ATR–FTIR of solid **3**



ATR–FTIR of solid **4**



ATR–FTIR of solid **5**

Fig. S6 ATR–FTIR of solids **1, 3, 4** and **5**.

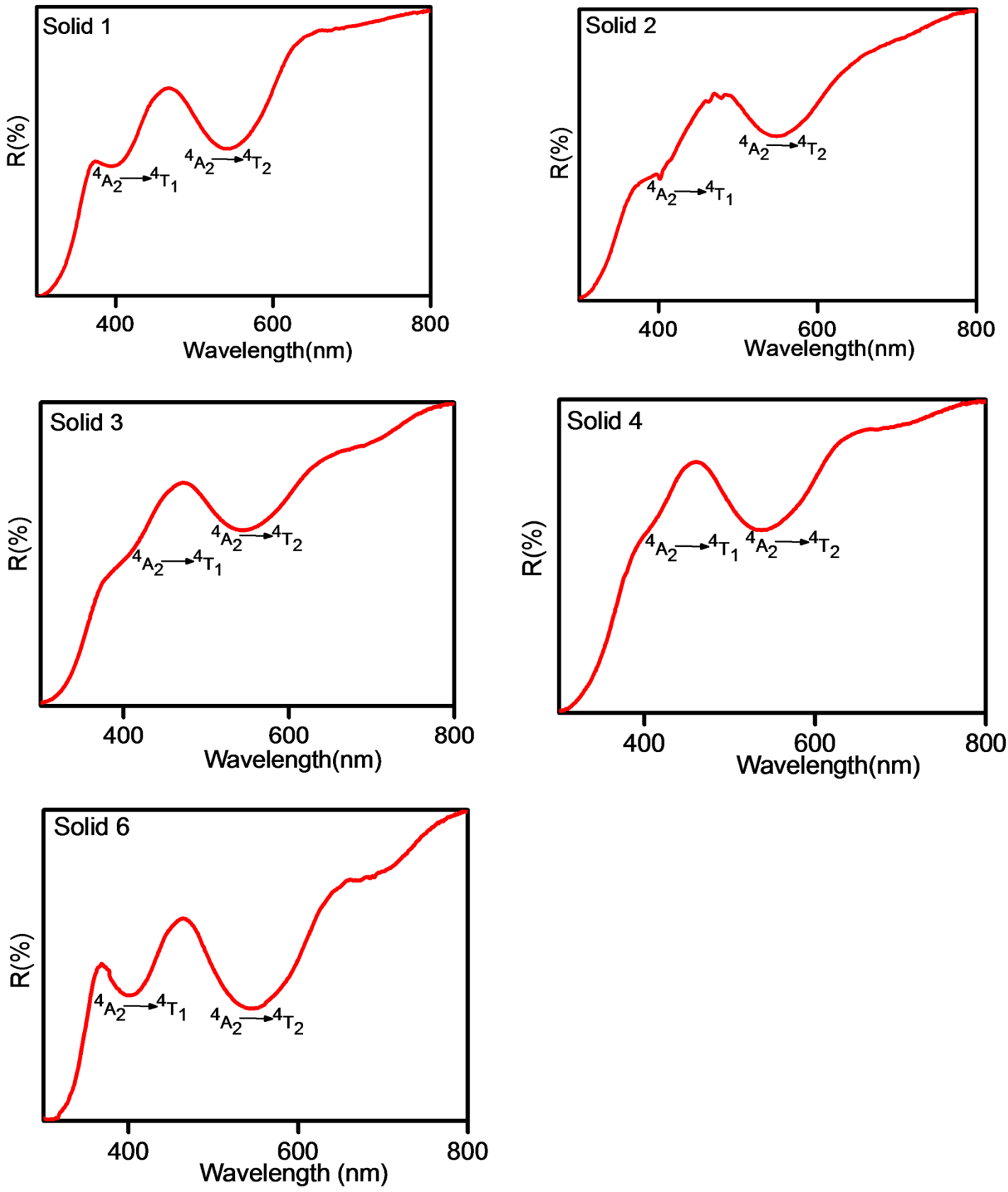


Fig. S7 Diffused reflectance of solids **1**–**4** and **6**.