

## Supporting information

**Table S1.** Selected bonds distances (Å) for compound **1**

Mo(1)-O(16)	1.672(4)	Mo(4)-O(24)	2.061(4)	Mn(2)-O(18)	2.181(4)
Mo(1)-O(7)	1.937(4)	Mo(4)-O(5)	2.123(4)	Mn(2)-O(1W)	2.224(5)
Mo(1)-O(3)	1.974(4)	Mo(4)-O(9)	2.247(4)	Mn(2)-O(15)	2.460(4)
Mo(1)-O(27)	2.074(4)	Mo(5)-O(11)	1.692(4)	P(1)-O(18)	1.507(4)
Mo(1)-O(5)	2.124(4)	Mo(5)-O(12)	1.938(4)	P(1)-O(13)	1.548(4)
Mo(1)-O(9)	2.293(4)	Mo(5)-O(1)	1.973(4)	P(1)-O(6)	1.559(4)
Mo(2)-O(29)	1.671(4)	Mo(5)-O(22)	2.057(4)	P(1)-O(9)	1.564(4)
Mo(2)-O(10)	1.938(4)	Mo(5)-O(4)	2.127(4)	P(2)-O(31)	1.482(4)
Mo(2)-O(2)	1.974(4)	Mo(5)-O(6)	2.237(3)	P(2)-O(27)	1.531(4)
Mo(2)-O(19)	2.036(4)	Mo(6)-O(14)	1.686(4)	P(2)-O(24)	1.537(4)
Mo(2)-O(4)	2.130(4)	Mo(6)-O(7)	1.935(4)	P(2)-O(28)	1.584(5)
Mo(2)-O(6)	2.284(3)	Mo(6)-O(3)	1.977(4)	P(3)-O(23)	1.516(4)
Mo(3)-O(26)	1.683(4)	Mo(6)-O(20)	2.045(4)	P(3)-O(30)	1.541(4)
Mo(3)-O(10)	1.937(4)	Mo(6)-O(8)	2.112(4)	P(3)-O(20)	1.546(4)
Mo(3)-O(2)	1.976(4)	Mo(6)-O(13)	2.298(4)	P(3)-O(25)	1.548(4)
Mo(3)-O(25)	2.048(4)	Mn(1)-O(2)	2.177(3)	P(4)-O(17)	1.495(4)
Mo(3)-O(8)	2.089(4)	Mn(1)-O(1)	2.203(4)	P(4)-O(19)	1.542(4)
Mo(3)-O(13)	2.315(4)	Mn(1)-O(3)	2.214(4)	P(4)-O(22)	1.545(4)
Mo(4)-O(21)	1.682(4)	Mn(2)-O(17)	2.123(4)	P(4)-O(15)	1.580(4)
Mo(4)-O(12)	1.937(4)	Mn(2)-O(31)	2.144(4)		
Mo(4)-O(1)	1.972(4)	Mn(2)-O(23)	2.147(4)		

**Table S2.** Selected bonds distances (Å) for compound **2**

Mo(1)-O(19)	1.679(3)	Mo(4)-O(3)	1.977(3)	Mn(2)-O(24)	2.069(3)
Mo(1)-O(6)	1.944(3)	Mo(4)-O(25)	2.064(3)	Mn(2)-O(13)	2.140(3)
Mo(1)-O(2)	1.984(3)	Mo(4)-O(18)	2.125(3)	Mn(2)-O(1W)	2.159(4)
Mo(1)-O(16)	2.043(3)	Mo(4)-O(10)	2.262(3)	Mn(2)-O(8)	2.205(3)
Mo(1)-O(5)	2.110(3)	Mo(5)-O(29)	1.687(3)	P(1)-O(22)	1.522(3)
Mo(1)-O(9)	2.269(3)	Mo(5)-O(12)	1.932(3)	P(1)-O(8)	1.529(3)
Mo(2)-O(20)	1.684(3)	Mo(5)-O(3)	1.971(3)	P(1)-O(16)	1.542(3)
Mo(2)-O(7)	1.934(3)	Mo(5)-O(14)	2.072(3)	P(1)-O(14)	1.551(3)
Mo(2)-O(4)	1.972(3)	Mo(5)-O(5)	2.115(3)	P(2)-O(13)	1.501(3)
Mo(2)-O(23)	2.057(3)	Mo(5)-O(9)	2.259(3)	P(2)-O(9)	1.550(3)
Mo(2)-O(11)	2.111(3)	Mo(6)-O(27)	1.678(3)	P(2)-O(10)	1.551(3)
Mo(2)-O(1)	2.305(3)	Mo(6)-O(6)	1.935(3)	P(2)-O(1)	1.553(3)
Mo(3)-O(17)	1.687(3)	Mo(6)-O(2)	1.978(3)	P(3)-O(24)	1.498(3)
Mo(3)-O(7)	1.923(3)	Mo(6)-O(15)	2.098(3)	P(3)-O(21)	1.521(3)

Mo(3)-O(4)	1.973(3)	Mo(6)-O(11)	2.100(3)	P(3)-O(25)	1.536(3)
Mo(3)-O(21)	2.031(3)	Mo(6)-O(1)	2.267(3)	P(3)-O(26)	1.573(4)
Mo(3)-O(18)	2.115(3)	Mn(1)-O(4)	2.193(3)	P(4)-O(31)	1.503(3)
Mo(3)-O(10)	2.269(3)	Mn(1)-O(2)	2.204(3)	P(4)-O(23)	1.514(3)
Mo(4)-O(28)	1.673(3)	Mn(1)-O(3)	2.222(3)	P(4)-O(15)	1.552(3)
Mo(4)-O(12)	1.931(3)	Mn(2)-O(22)	2.050(3)	P(4)-O(30)	1.578(3)

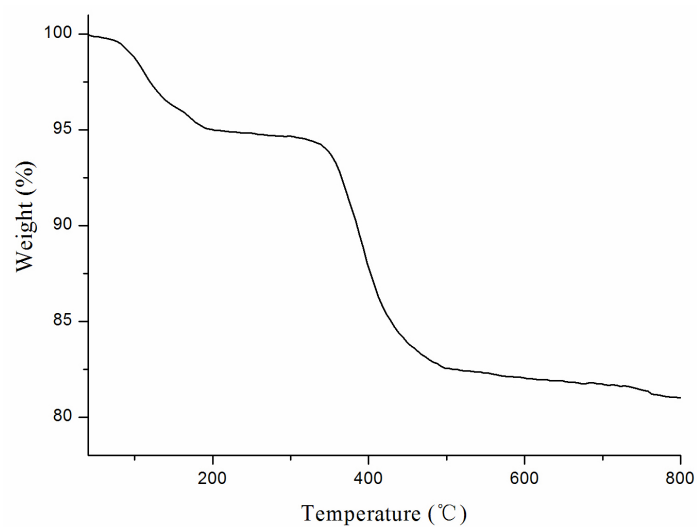
**Table S3.** Selected bonds distances (Å) for compound **3**

Mo(1)-O(14)	1.6857(18)	Mo(4)-O(3)	1.9354(16)	Mn(1)-O(1)	2.2078(17)
Mo(1)-O(13)	1.9321(17)	Mo(4)-O(1)	1.9764(17)	P(1)-O(31)	1.5060(18)
Mo(1)-O(2)	1.9794(15)	Mo(4)-O(23)	2.0454(18)	P(1)-O(23)	1.5374(19)
Mo(1)-O(24)	2.0255(16)	Mo(4)-O(4)	2.1060(17)	P(1)-O(20)	1.5402(19)
Mo(1)-O(6)	2.1093(17)	Mo(4)-O(17)	2.2829(16)	P(1)-O(28)	1.5658(18)
Mo(1)-O(7)	2.2576(16)	Mo(5)-O(19)	1.6821(18)	P(2)-O(10)	1.5171(16)
Mo(2)-O(16)	1.6775(17)	Mo(5)-O(25)	1.9371(17)	P(2)-O(7)	1.5469(18)
Mo(2)-O(3)	1.9324(17)	Mo(5)-O(12)	1.9783(15)	P(2)-O(17)	1.5472(17)
Mo(2)-O(1)	1.9760(16)	Mo(5)-O(22)	2.0261(16)	P(2)-O(8)	1.5537(17)
Mo(2)-O(11)	2.0503(17)	Mo(5)-O(6)	2.1183(17)	P(3)-O(15)	1.5118(19)
Mo(2)-O(9)	2.1113(17)	Mo(5)-O(7)	2.2564(17)	P(3)-O(11)	1.5352(17)
Mo(2)-O(8)	2.2716(16)	Mo(6)-O(29)	1.6725(18)	P(3)-O(5)	1.5418(19)
Mo(3)-O(26)	1.6813(18)	Mo(6)-O(25)	1.9350(16)	P(3)-O(21)	1.5609(19)
Mo(3)-O(13)	1.9537(15)	Mo(6)-O(12)	1.9703(16)	P(4)-O(27)	1.5178(17)
Mo(3)-O(2)	1.9699(17)	Mo(6)-O(5)	2.0797(17)	P(4)-O(30)	1.5226(19)
Mo(3)-O(20)	2.0752(17)	Mo(6)-O(9)	2.1243(16)	P(4)-O(24)	1.5594(18)
Mo(3)-O(4)	2.0923(16)	Mo(6)-O(8)	2.2829(17)	P(4)-O(22)	1.5605(19)
Mo(3)-O(17)	2.2815(16)	Mn(1)-O(2)	2.1820(16)		
Mo(4)-O(18)	1.6794(17)	Mn(1)-O(12)	2.2039(16)		

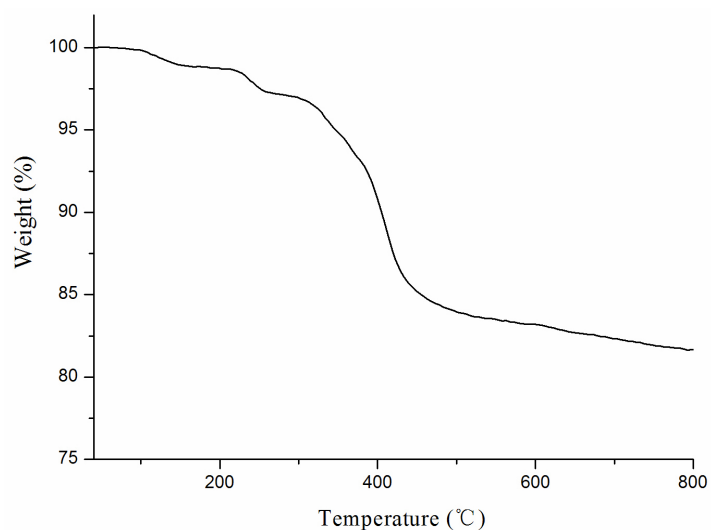
**Table S4.** Selected bonds distances (Å) for compound **4**

Mo(1)-O(21)	1.685(3)	Mo(4)-O(15)	1.926(3)	Cu(1)-O(2)	2.271(3)
Mo(1)-O(5)	1.940(3)	Mo(4)-O(4)	1.950(3)	Cu(2)-O(17)	1.839(3)
Mo(1)-O(1)	1.946(3)	Mo(4)-O(12)	2.062(3)	P(1)-O(17)	1.514(4)
Mo(1)-O(11)	2.092(3)	Mo(4)-O(10)	2.132(3)	P(1)-O(7)	1.544(3)
Mo(1)-O(6)	2.122(3)	Mo(4)-O(8)	2.302(3)	P(1)-O(8)	1.548(3)
Mo(1)-O(3)	2.257(3)	Mo(5)-O(31)	1.677(4)	P(1)-O(3)	1.551(3)
Mo(2)-O(24)	1.694(4)	Mo(5)-O(15)	1.937(3)	P(2)-O(20)	1.501(4)
Mo(2)-O(5)	1.940(3)	Mo(5)-O(4)	1.958(3)	P(2)-O(23)	1.530(4)
Mo(2)-O(1)	1.961(3)	Mo(5)-O(23)	2.079(3)	P(2)-O(18)	1.541(4)
Mo(2)-O(13)	2.055(3)	Mo(5)-O(14)	2.125(3)	P(2)-O(30)	1.577(4)
Mo(2)-O(10)	2.111(3)	Mo(5)-O(7)	2.279(3)	P(3)-O(19)	1.506(4)
Mo(2)-O(8)	2.277(3)	Mo(6)-O(29)	1.687(3)	P(3)-O(16)	1.521(4)

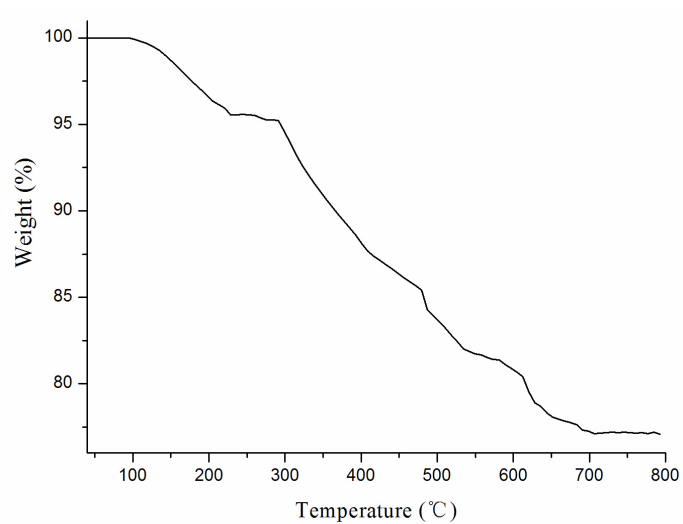
Mo(3)-O(22)	1.692(3)	Mo(6)-O(9)	1.937(3)	P(3)-O(11)	1.548(3)
Mo(3)-O(9)	1.934(3)	Mo(6)-O(2)	1.959(3)	P(3)-O(28)	1.563(4)
Mo(3)-O(2)	1.951(3)	Mo(6)-O(18)	2.053(3)	P(4)-O(26)	1.509(4)
Mo(3)-O(16)	2.058(3)	Mo(6)-O(14)	2.105(3)	P(4)-O(13)	1.528(4)
Mo(3)-O(6)	2.100(3)	Mo(6)-O(7)	2.275(3)	P(4)-O(12)	1.534(4)
Mo(3)-O(3)	2.290(3)	Cu(1)-O(1)	2.204(3)	P(4)-O(27)	1.570(4)
Mo(4)-O(25)	1.692(4)	Cu(1)-O(4)	2.243(3)		



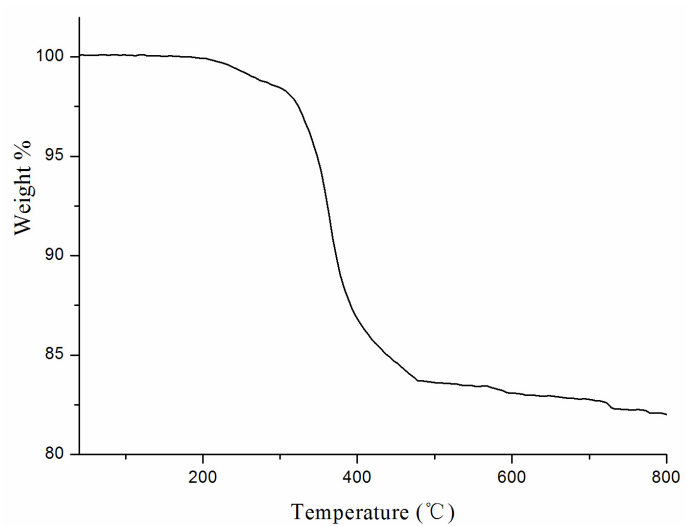
**Fig. S1(a)** Thermogravimetric analysis of compound **1** in flowing N<sub>2</sub> at 10°C/min.



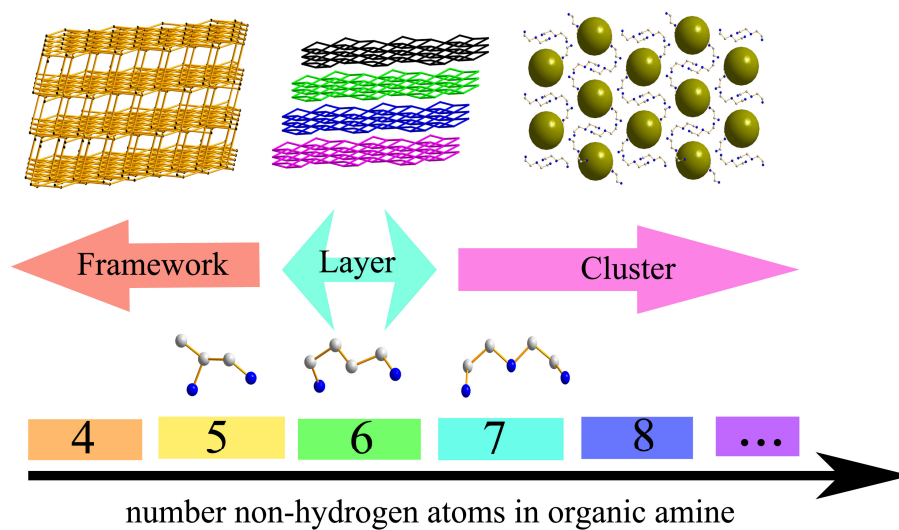
**Fig. S1(b)** Thermogravimetric analysis of compound **2** in flowing N<sub>2</sub> at 10°C/min.



**Fig. S1(c)** Thermogravimetric analysis of compound **3** in flowing N<sub>2</sub> at 10°C/min.



**Fig. S1(d)** Thermogravimetric analysis of compound **4** in flowing N<sub>2</sub> at 10°C/min.



**Fig. S2** Organic amine template effect in reduced manganese molybdenum phosphates.