Supporting Information

Highly Porous Aluminophosphates with Unique Three Dimensional Open Framework Structures from Mild Hydrothermal Syntheses

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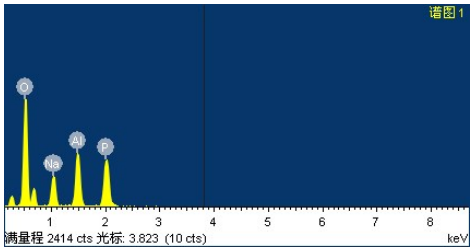
Element	Atom ratio
O K	71.44
Na K	8.32
Al K	9.65
P K	10.60



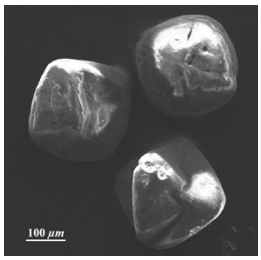
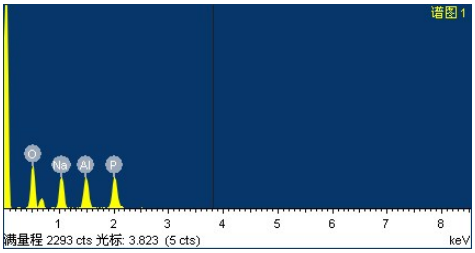


Figure S1: EDX and SEM images of α-$NaAlPO_4(OH)$(**1**).

Elements	Atom ratio
O K	60.25
Na K	15.57
Al K	10.64
P K	13.54



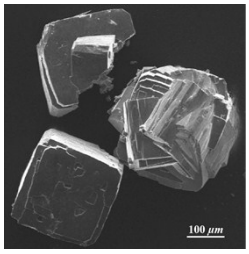
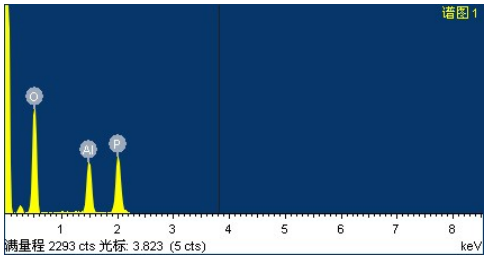


Figure S2: EDX and SEM images of β-$NaAlPO_4(OH)$(**2**).

Element	Atom ratio
O K	60.23
Al K	12.49
P K	18.28



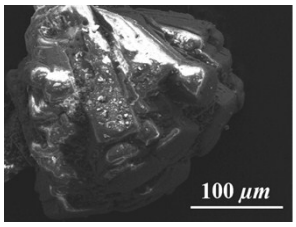


Figure S3: EDX and SEM images of $Al_{3.5}P_{5.5}O_{19}$(**3**).

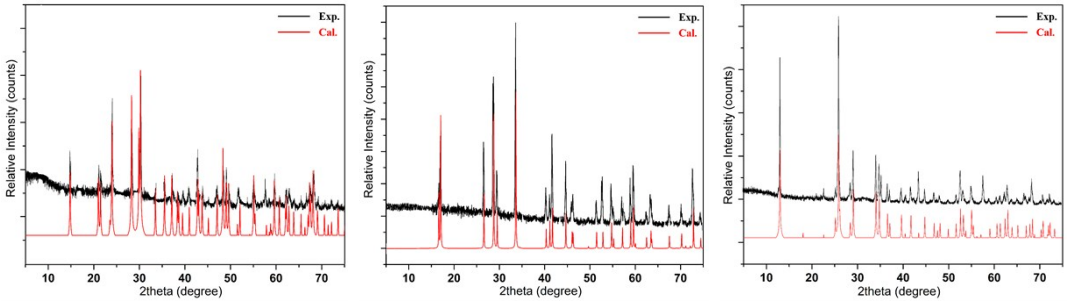


Figure S4: Experimental (black) and simulated (red) **PXRD** of α-$NaAlPO_4(OH)$(**1**) (a), β-$NaAlPO_4(OH)$(**2**) (b) and $Al_{3.5}P_{5.5}O_{19}$(**3**) (c)

Table S1. Important Bond Lengths (angstroms) and Important Bond angles (degrees) for α-$NaAlPO_4(OH)$(**1**), β-$NaAlPO_4(OH)$(**2**) and $Al_{3.5}P_{5.5}O_{19}$(**3**).

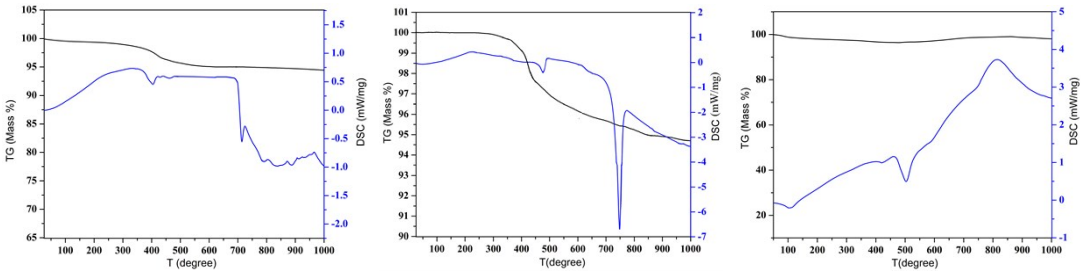
1		**2**		**3**	
P(1)-O(2)	1.522(5)	P(1)-O(3)#1	1.527(5)	P(1)-O(3)	1.471(15)
P(1)-O(2)#1	1.522(5)	P(1)-O(3)#2	1.527(5)	P(1)-O(2)#1	1.5104(17)
P(1)-O(3)#1	1.530(5)	P(1)-O(3)#3	1.527(5)	P(1)-O(2)	1.5104(17)
P(1)-O(3)	1.530(5)	P(1)-O(3)	1.527(5)	P(1)-O(1)	1.541(2)
Al(1)-O(2)#6	1.846(6)	Al(1)-O(2)	1.826(10)	Al(1)-O(2)	1.8210(17)
Al(1)-O(2)#1	1.846(6)	Al(1)-O(1)	1.865(4)	Al(1)-O(2)#2	1.8210(17)
Al(1)-O(1)#7	1.849(3)	Al(1)-O(3)	1.884(5)	Al(1)-O(2)#3	1.8210(17)
Al(1)-O(1)	1.849(3)	Al(1)-O(3)#8	1.884(5)	Al(1)-O(1)#4	1.9695(17)
Al(1)-O(3)#3	1.872(5)	Al(1)-O(3)#9	1.884(5)	Al(1)-O(1)#5	1.9695(17)
Al(1)-O(3)#8	1.872(5)	Al(1)-O(3)#10	1.884(5)	Al(1)-O(1)#6	1.9695(17)
O(2)-Na(1)	2.264(18)	O(1)-Na(1)#11	2.472(10)		
O(2)-Na(1)#13	2.43(2)	O(1)-Na(1)#8	2.472(10)	O(3)-P(1)-O(2)#1	107.7(4)
O(3)-Na(1)#5	2.351(14)	O(1)-Na(1)#12	2.472(10)	O(3)-P(1)-O(2)	107.7(4)
O(3)-Na(1)#3	2.549(18)	O(1)-Na(1)	2.472(10)	O(2)#1-P(1)-O(2)	114.26(13)
O(3)-Na(1)	2.708(19)	O(2)-Na(2)#4	2.33(3)	O(3)-P(1)-O(1)	104.6(8)
O(3)-Na(1)#10	2.78(3)	O(2)-Na(2)#13	2.33(3)	O(2)#1-P(1)-O(1)	111.01(8)
Na(1)-O(3)#14	2.351(14)	O(2)-Na(2)#14	2.33(3)	O(2)-P(1)-O(1)	111.01(8)
Na(1)-O(2)#3	2.43(2)	O(2)-Na(2)#15	2.33(3)	O(2)-Al(1)-O(2)#2	98.15(8)
Na(1)-O(3)#13	2.549(18)	O(2)-Na(1)#4	2.428(9)	O(2)-Al(1)-O(2)#3	98.15(8)
Na(1)-O(3)#15	2.78(3)	O(2)-Na(1)#15	2.428(9)	O(2)#2-Al(1)-O(2)#3	98.15(8)
		O(2)-Na(1)#14	2.428(9)	O(2)-Al(1)-O(1)#4	164.87(9)
O(2)-P(1)-O(2)#1	113.5(4)	O(2)-Na(1)#13	2.428(9)	O(2)#2-Al(1)-O(1)#4	91.70(8)
O(2)-P(1)-O(3)#1	111.0(3)	O(3)-Na(1)#11	2.429(6)	O(2)#3-Al(1)-O(1)#4	91.75(8)
O(2)#1-P(1)-O(3)#1	103.9(3)	O(3)-Na(1)	2.429(6)	O(2)-Al(1)-O(1)#5	91.70(8)
O(2)-P(1)-O(3)	103.9(3)	O(3)-Na(2)#5	2.46(2)	O(2)#2-Al(1)-O(1)#5	91.75(8)
O(2)#1-P(1)-O(3)	111.0(3)	O(3)-Na(2)	2.46(2)	O(2)#3-Al(1)-O(1)#5	164.87(9)
O(3)#1-P(1)-O(3)	113.7(4)	Na(1)-O(2)#15	2.428(9)	O(1)#4-Al(1)-O(1)#5	76.47(8)
O(2)#6-Al(1)-O(2)#1	95.0(4)	Na(1)-O(2)#17	2.428(9)	O(2)-Al(1)-O(1)#6	91.75(8)
O(2)#6-Al(1)-O(1)#7	88.42(19)	Na(1)-O(3)#18	2.429(6)	O(2)#2-Al(1)-O(1)#6	164.87(9)
O(2)#1-Al(1)-O(1)#7	176.3(2)	Na(1)-O(3)#8	2.429(6)	O(2)#3-Al(1)-O(1)#6	91.70(8)
O(2)#6-Al(1)-O(1)	176.3(2)	Na(1)-O(3)#19	2.429(6)	O(1)#4-Al(1)-O(1)#6	76.47(8)
O(2)#1-Al(1)-O(1)	88.42(19)	Na(2)-O(2)#17	2.33(3)	O(1)#5-Al(1)-O(1)#6	76.47(8)
O(1)#7-Al(1)-O(1)	88.21(18)	Na(2)-O(2)#15	2.33(3)	O(2)-Al(1)-Al(1)#7	119.25(6)
O(2)#6-Al(1)-O(3)#3	90.7(2)	Na(2)-O(3)#3	2.46(2)	O(2)-Al(1)-Al(1)#7	119.25(6)
O(2)#1-Al(1)-O(3)#3	95.1(2)	Na(2)-O(3)#19	2.46(2)	O(2)-Al(1)-Al(1)#7	119.25(6)
O(1)#7-Al(1)-O(3)#3	86.2(3)	Na(2)-O(3)#5	2.46(2)	O(1)#4-Al(1)-Al(1)#	45.61(5)
O(1)-Al(1)-O(3)#3	87.6(3)			O(1)-Al(1)-Al(1)#7	45.61(5)
O(2)#6-Al(1)-O(3)#8	95.1(2)	O(3)-P(1)-O(3)#2	106.5(4)	O(1)-Al(1)-Al(1)#7	45.61(5)
O(2)#1-Al(1)-O(3)#8	90.7(2)	O(3)-P(1)-O(3)#3	110.98(18)	P(1)-O(3)	1.471(15)

O(1)#7-Al(1)-O(3)#8	87.6(3)	O(3)-P(1)-O(3)#3	110.98(18)	P(1)-O(2)#1	1.5104(17)
		O(3)#1-P(1)-O(3)	110.98(18)	P(1)-O(2)	1.5104(17)
		O(3)#2-P(1)-O(3)	110.98(18)	P(1)-O(1)	1.541(2)
		O(3)#3-P(1)-O(3)	106.5(4)	Al(1)-O(2)	1.8210(17)
		O(2)-Al(1)-O(1)	180	Al(1)-O(2)#2	1.8210(17)
		O(2)-Al(1)-O(3)	95.6(2)	Al(1)-O(2)#3	1.8210(17)
		O(1)-Al(1)-O(3)	84.4(2)	Al(1)-O(1)#4	1.9695(17)
		O(2)-Al(1)-O(3)#8	95.6(2)	Al(1)-O(1)#5	1.9695(17)
		O(1)-Al(1)-O(3)#8	84.4(2)	Al(1)-O(1)#6	1.9695(17)
		O(3)-Al(1)-O(3)#8	89.46(4)		
		O(2)-Al(1)-O(3)#9	95.6(2)	O(3)-P(1)-O(2)#1	107.7(4)
		O(1)-Al(1)-O(3)#9	84.4(2)	O(3)-P(1)-O(2)	107.7(4)
		O(3)-Al(1)-O(3)#9	168.8(4)	O(2)#1-P(1)-O(2)	114.26(13)
		O(3)-Al(1)-O(3)#9	89.46(4)	O(3)-P(1)-O(1)	104.6(8)
		O(2)-Al(1)-O(3)	95.6(2)	O(2)#1-P(1)-O(1)	111.01(8)
		O(1)-Al(1)-O(3)	84.4(2)	O(2)-P(1)-O(1)	111.01(8)
		O(3)-Al(1)-O(3)	89.46(4)	O(2)-Al(1)-O(2)#2	98.15(8)
		O(3)#8-Al(1)-O(3)	168.8(4)	O(2)-Al(1)-O(2)#3	98.15(8)
		O(3)#9-Al(1)-O(3)	89.46(4)	O(2)#2-Al(1)-O(2)#3	98.15(8)

1. Symmetry transformations used to generate equivalent atoms:
#1 y,x,-z+2; #2 x+1/2,-y+3/2,-z+9/4; #5 -x+1,-y+2,z-1/2; #6 x,y,z-1; #7 -x+2,-y+2,z-1/2; #8 x+1/2,-y+3/2,-z+5/4; #9 -x+3/2,y-1/2,-z+7/4; #10 y-1/2,-x+3/2,z-3/4; #11 -x+2,-y+2,z+1/2; #12 x,y,z+1; #13 y-1/2, -x+3/2,z+1/4; #14 -x+1, -y+2, z+1/2; #15 -y+3/2,x+1/2,z+3/4

2. Symmetry transformations used to generate equivalent atoms:
#1 -y+1/2,x-1/2,-z+1/2; #2 y+1/2,-x+1/2,-z+1/2; #3 -x+1,-y,z; #4 -y+1/2,x-1/2,z-1/2; #5 -x+1,-y,-z+1; #6 x-1/2,y-1/2,z-1/2; #7 -y+1,x-1,z; #8 -y+1,x,z; #9 -x+1,-y+1,z; #10 y,-x+1,z; #11 y,-x+1,-z+1; #12 -x+1,-y+1,-z+1; #13 x-1/2,y+1/2,z-1/2; #14 y+1/2,-x+3/2,-z+1/2; #15 -x+3/2,-y+1/2,-z+1/2; #16 y+1,-x+1,-z+1; #17 x+1/2,y-1/2,z+1/2 #18 -y+1,x,-z+1

3. Symmetry transformations used to generate equivalent atoms:
#1 x,y,-z+1/2; #2 -y+1,x-y+1,z; #3 -x+y,-x+1,z; #4 y-1,-x+y,-z; #5 -x+1,-y+2,-z; #6 x-y+1,x,-z; #7 x,y,-z-1/2; #8 -x+1,-y+2,z+1/2



(a) (b) (c)

Figure S5: TG-DSC curves of α-$NaAlPO_4(OH)$(**1**) (a), β-$NaAlPO_4(OH)$(**2**) (b) and $Al_{3.5}P_{5.5}O_{19}$(**3**) (c).

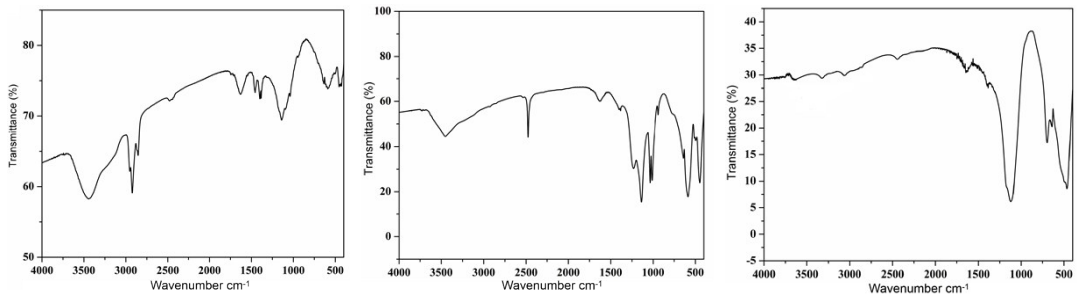


Figure S6: IR spectra of -$NaAlPO_4(OH)$(**1**) (a), β-$NaAlPO_4(OH)$(**2**) (b) and $Al_{3.5}P_{5.5}O_{19}$(**3**) (c).