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MS-10-P-3525 A novel structure of aluminium phosphate zeolite sovled by RED (Rotation Electron Diffraction)

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Normally, X-ray diffraction (XRD) has been used to get the structure of the crystalline materials for a long time. Compared to XRD, electron diffraction has two advantages. The size of the crystals can be as smaller as 5nm*5nm*5nm and the phase information can be obtained from high-resolution transmission electron microscopy (HRTEM) images [1]. The rotation electron diffraction (RED) method [2] makes the structure determination by electron crystallography more convenient and effective.

Aluminophosphate (APO) molecular sieves were synthesised by the U.S. company (Union Carbide) in 1980s [3]. Here, we report a new structure, an aluminium phosphate zeolite with special seven-member ring. For this new material, the crystal is not big enough to be characterized by traditional methods such as single X-Ray diffraction. The RED (Rotation Electron Diffraction) method has been used here to determine the structure of this aluminium phosphate zeolite. The data of RED has been shown in Figure 1. The structure of this APO zeolite has been solved and been shown in Figure 2.

[1]Willhammar, T., Yun, Y. & Zou, X. Structural Determination of Ordered Porous Solids by Electron Crystallography. Adv. Funct. Mater. 24, 182–199 (2014).

[2]Wan, W., Sun, J., Su, J., Hovmöller, S. & Zou, X. Three-dimensional rotation electron diffraction: software RED for automated data collection and data processing. J. Appl. Cryst. 46, 1863–1873 (2013).

[3]Wilson S., Lok B. USP: 4310440, 1982.

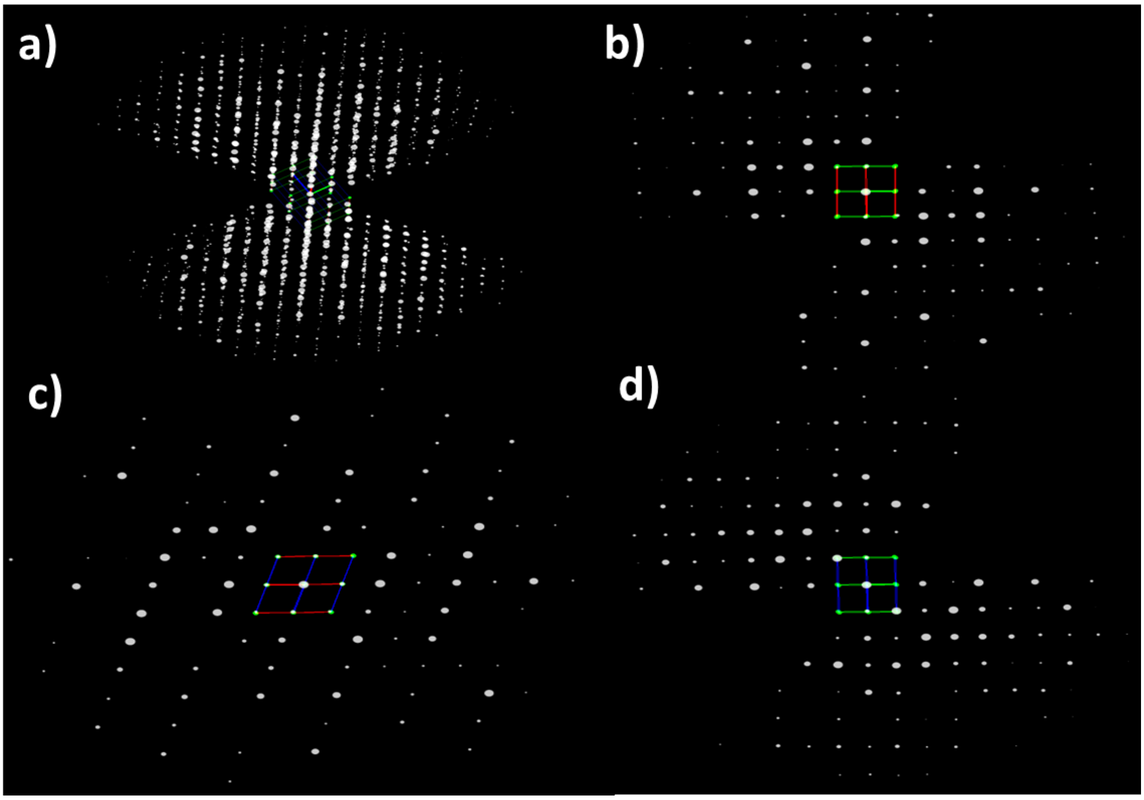

Fig. 1: Figure 1 a) Overview of the diffraction data collected by RED. b) Along a* axis in reciprocal space. c) Along b* axis in reciprocal space. d) Along c* axis in reciprocal space. (Reflection condition: h00, h=2n; 0k0, k=2n; h0l, h=2n)

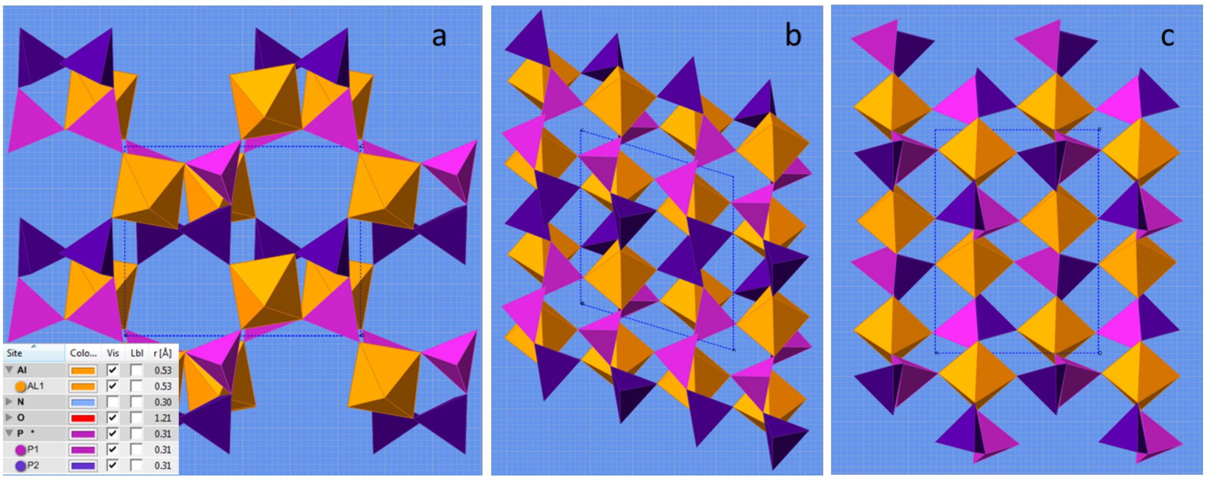

Fig. 2: Figure 2 The structure solved by using Shelx. a) Along a axis; b) Along b axis; c) Along c axis; (Unit cell: a = 8.257 Å, b = 9.910 Å, c= 7.605 Å, α= 90.02°, β=106.87°, γ = 90.01° Space group: P21/a)