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Structure determination of submicron-sized porous materials by EM and XRD

J. Sun[1]

[1]*Peking University, College of Chemistry and Molecular Engineering, Beijing, China*

Structure determination of submicron-sized porous materials is always a great challenge for widening their industrial application. There are a few reasons for this challenge, such as 1) their big unit cell dimensions cause serious peak overlapping in powder X-ray diffraction (PXRD); 2) typical disordered guest molecules in the big portion of pores lower the resolution; 3) their relatively low stability prevents an easy application of high resolution transmission electron microscope image (HRTEM) and STEM techniques. PXRD and electron diffraction (ED) techniques are complimentary for the structure determination of such materials. The PXRD technique gives very accurate intensities and the major difficulty for the structure determination from PXRD is the peak overlapping while there is almost no peak overlapping in ED since the single-crystal-like ED patterns can be obtained from nano-sized crystals. For the ED techniques, the intensities suffer severely from dynamical effects which make it less reliable for the structure determination in many cases. The combination of them can overcome both shortcomings and solve most difficulties in the structure determination of submicron-sized porous materials. Here we will use a few examples to demonstrate how this combination facilitates the structure determination, such as ITQ-37, PKU-16, PKU-3, ITQ51.

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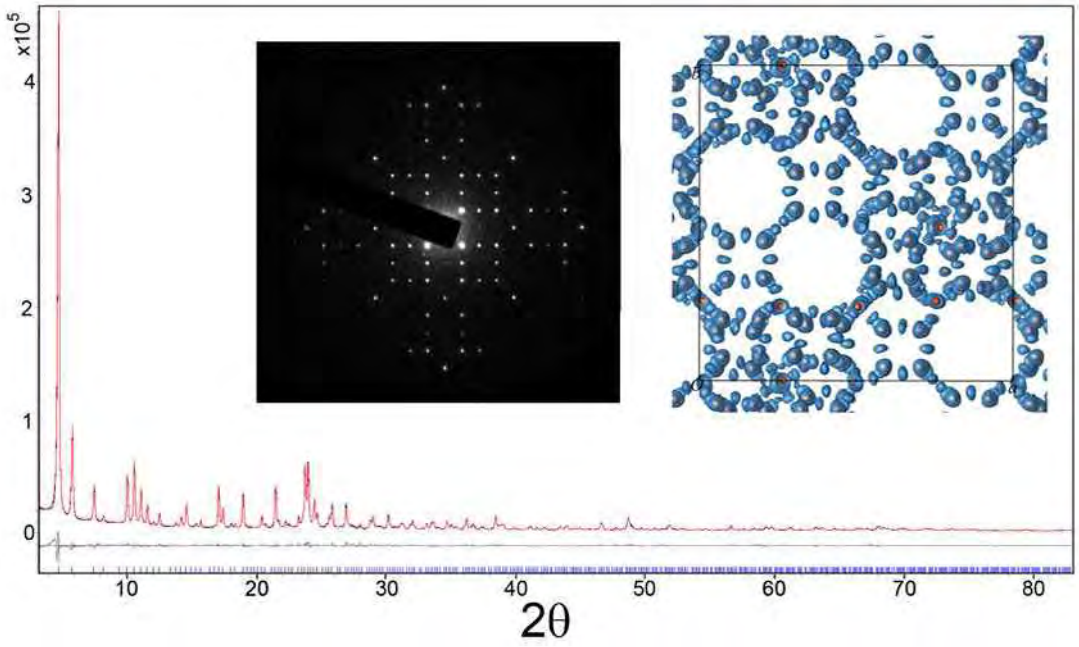

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