# ΣΕΙΡΑ ΣΕΜΙΝΑΡΙΩΝ ΙΤΕ/ΕΙΧΗΜΥΘ

## Recent Results in Aluminophosphate Molecular Sieve Research

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*Abstract:*

The discovery of aluminophosphate molecular sieves, $AlPO_4$s, in addition to aluminosilicate zeolites, and the growing ability for modifying both types of systems by framework-substituting transition metals Co, Mn, Zn etc., have greatly extended the class of microporous crystalline solids whose main uses are as adsorbents, ion-exchangers, and catalysts.

In order to understand the structure-properties relationships of zeolites and zeolite-like materials, the development of characterisation methods have become increasingly important. The recent gains in synchrotron X-ray intensity and brilliance, and improvements in X-ray detectors design and data handling are important features that make synchrotron radiation a unique probe for *in situ* and time-resolved studies also on powders and microcrystals. *In situ* time-resolved studies of the formation of catalysts are valuable for the investigation of the kinetics of formation and for the detection and determination of intermediate phases. By probing the catalyst at actual working conditions it is possible to obtain a clear representation of the structural and chemical changes involved in the catalytic and other reactivities. Anomalous dispersion methods, which employ the tuneability of synchrotron X-ray sources, have proved to be very successful in structure determination of zeolitic materials, especially for locating the active transition metal sites within the frameworks.

Recent results in the phosphate-based molecular sieves synthesis and characterisation include (1) the use of anomalous dispersion method for the determination of the site of cobalt incorporation in a zincophosphate framework, (2) the precise determination of the phase transitions in the chabazite-like aluminophosphate system by using *in situ* powder diffraction methods, and (3) the synthesis of aluminophosphates in the presence of metal-chelate complexes, e.g. "ship-in-a-bottle" synthesis.