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Because of experimental difficulties, almost no information is available about the precursors in zeolite crystallization. Recently valuable information has been obtained using visible light scattering techniques, but these are restricted to systems transparent for (visible) laser radiation.

Here we report on the investigation of the formation of precursor particles in the crystallization of zeolites from gelating systems using X-ray scattering at ultra small angles (USAXS) at the ESRF. The preparations were performed in situ in the beam, using a rotating and heated cell.

The crystallization of Si-MFI using trimethylene-bis(N-hexyl, N-methyl-piperidium) as structure directing agent shows the formation of two categories of precursors: gel particles (600 nm) and primary units (2.5 nm). The size of the primary units for the crystallization of SiMFI is found to be the same for gelating and non-gelating systems, also if different structure directing agents have been used. Zeolites Si-BEA and Si-MTW have been prepared with the same template (trimethylene-bis-(N-benzyl, N-methyl-piperidium)) at different concentrations. Now primary units with a size of 2.6 and 1.5 nm are found to be present as precursors of BEA respectively MTW. Our data strongly suggest that these nanometer scaled primary units are specific for the zeolite topology formed.