Electronic Supplementary Material (ESI) for RSC Advances

Supporting Information.

Experimental (Materials and Methods).

Synthesis Methods.

Two different synthesis solution having the following molar composition i) $13.76SiO_2:1Al_2O_3:32.34NaOH:460H_2O$ and ii) $13.76SiO_2:1Al_2O_3:32.34NaOH:285H_2O$ have been chosen to text our plans. All the reagents used for preparing the solution were purchased from commercial sources and used without further purification: Sodium Aluminate (Carlo Erba Reagenti, 53–55% Al_2O_3), Sodium Silicate Solution (Aldrich, NaOH 14 wt.% and SiO_2 27 wt.%), Sodium Hydroxide (NaOH pellets, 97%, Carlo Erba Reagenti).

Both solutions were aged for 6 hours at ambient temperature under continuous stirring before their use.

The FAU nanocrystals were synthesized by conventional hydrothermal treatment under static condition, by pouring the synthesis solution in a Teflon-lined autoclave containing the FAU membrane grown in the inner side of a porous α-Al_2O_3 asymmetric tube (IKTS, I.D. = 7 mm, O.D. = 10 mm, lenght = 100 mm, dpore = 100 or 70 nm). The autoclave was vertically placed in the pre-heated furnace at 100°C for the hydrothermal treatment.

The growth of the zeolite nanocrystals was monitored at regular intervals of time. The products obtained after 1, 3, 4, 5.5 and 6 hours of reaction were recovered from the autoclaves, separated from the non-reacted mother liquors by centrifugation, then dried under ambient conditions. The nanosized particles recovered after each individual synthesis step were characterized by SEM, RDX, FT-IR and EDX. DLS analyses were also carried out on the suspensions obtained by dispersing the nanoparticles (1.5 wt.%) in aqueous solutions, whose pH was adjusted at 9.5 by addition of few drops of NaOH 0.1 M. Each suspension was kept under vigorous stirring for 24 hours in the attempt of avoiding the formation of particles aggregates.

Characterization.

FT-IR in ATR mode was recorded on Thermo Fisher Scientific Nicolet iS10 Spectrometer.

The morphology of the zeolite particles prepared in this work were investigated by using a Cambridge Zeiss LEO 400 scanning electron microscope (SEM). The Si/Al ratio was determined by energy dispersive X-ray (EDX) performed with a EDAX-Phoenix (SUTW Detector, analyzer: Si/Li crystal). The powder X-ray diffraction (XRD) patterns of zeolite samples extracted after each individual hydrothermal synthesis stage were collected on a Philips PW 1730/10 X-ray diffractometer (Ni filtered Cu Ka1 + Ka2, λ = 1.542 Å). The mean particle size, particle size

distribution of the crystals stabilized in water suspensions were determined by dynamic light scattering (DLS) using a MALVERN MASTERSIZER 2000, MALVERN INSTRUMENTS, WORCESTERSHIRE, UK.

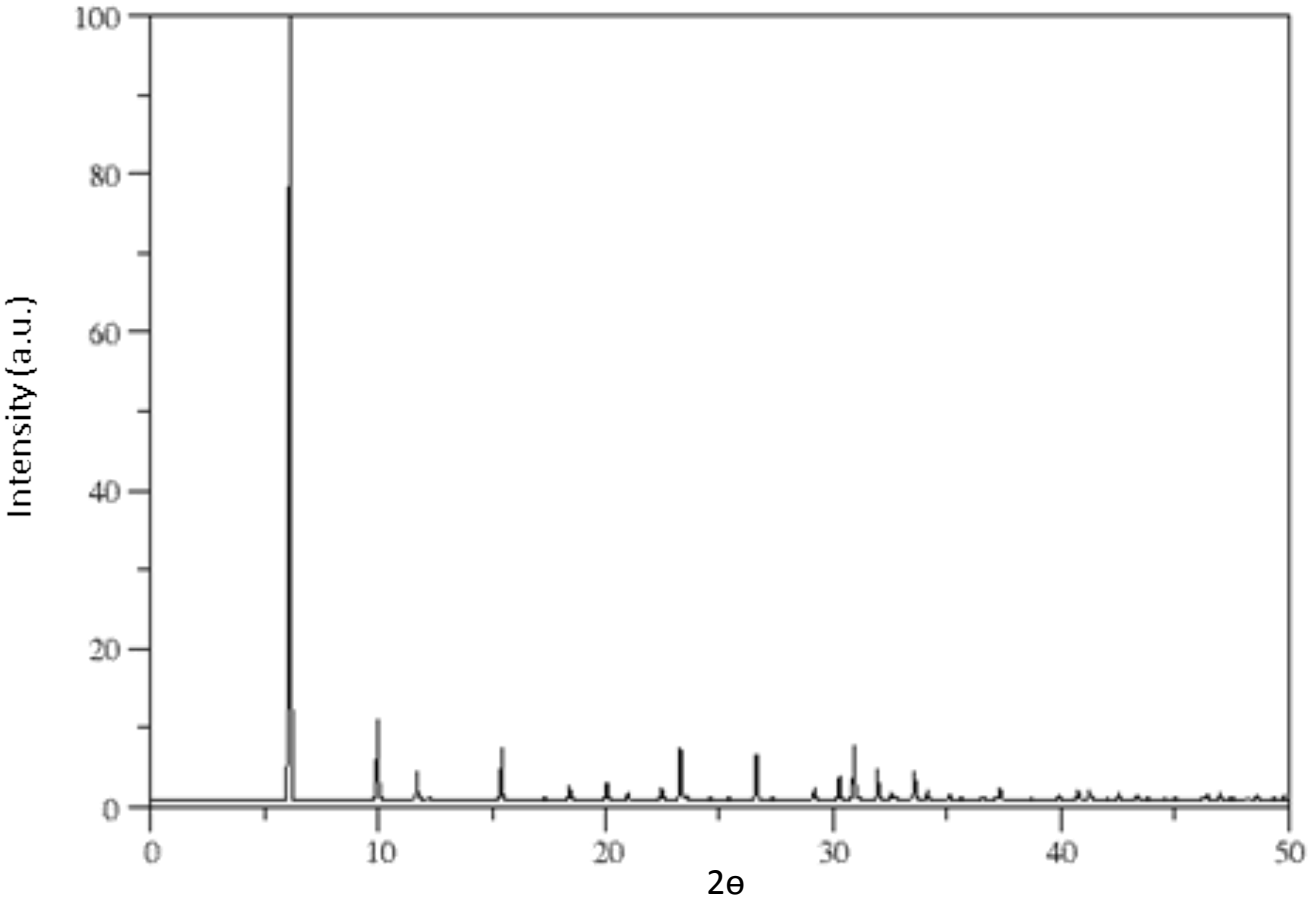
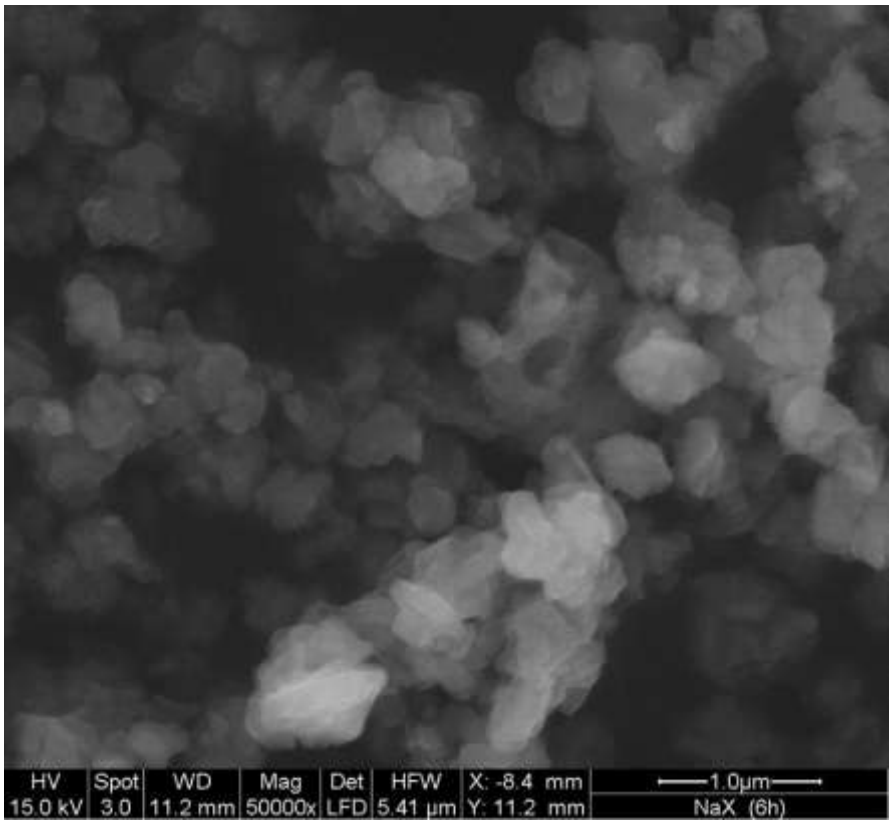


Figure S1. Powder pattern generated for Faujasite (FAU) from Database of Zeolite Structures.

a)



b)

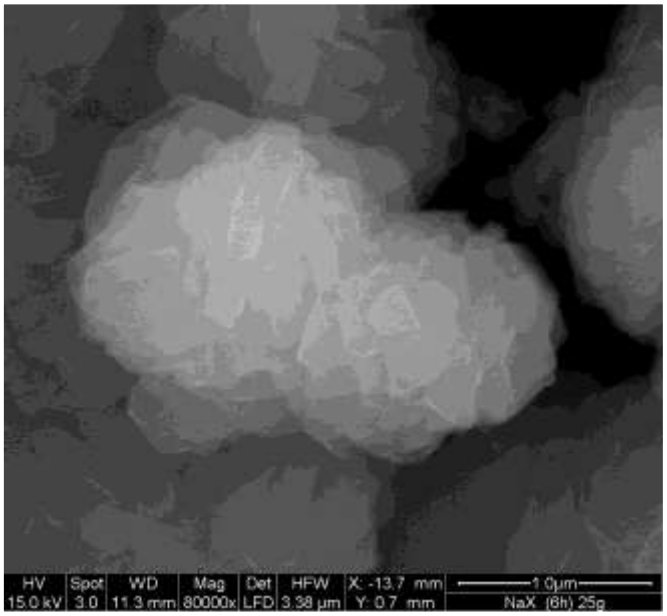
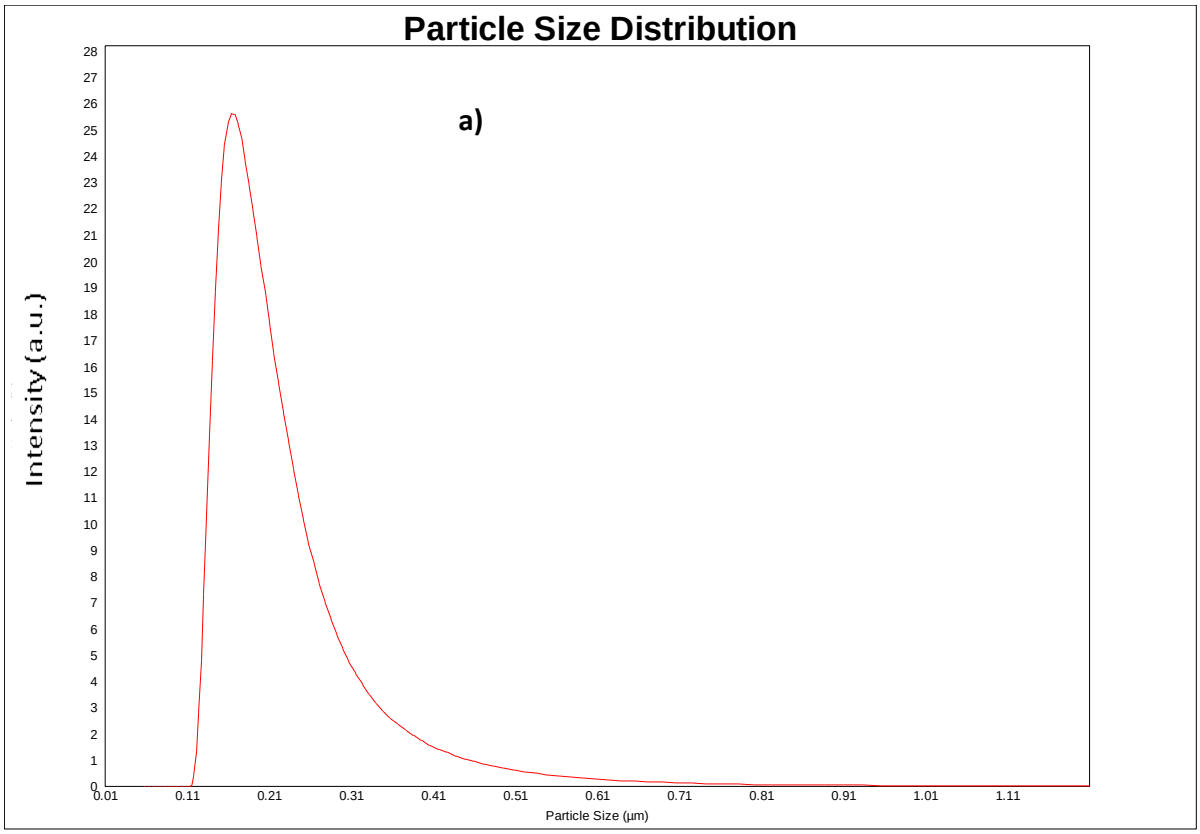


Figure S2. SEM images of the synthesized FAU nanocrystals i) at 6 hours of hydrothermal treatment.



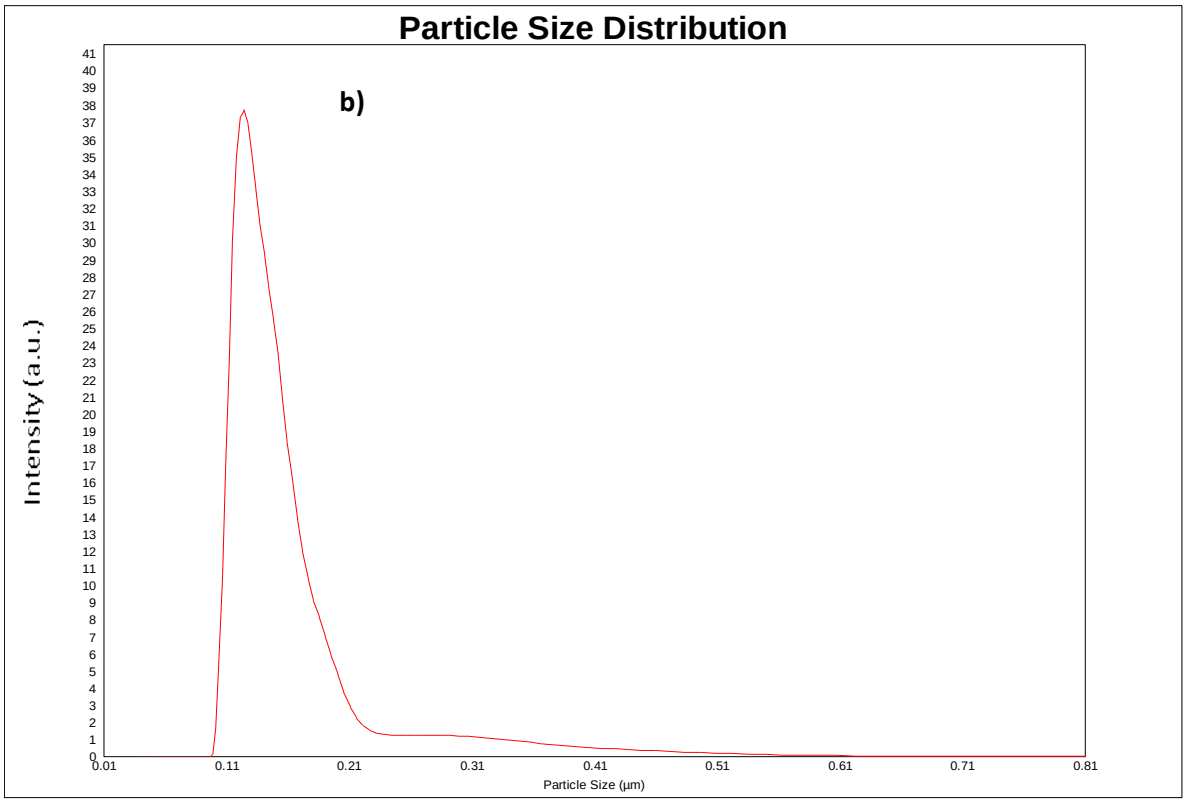


Figure S3. DLS distribution curves of the synthesized FAU nanocrystals i) (a) and ii)(b) obtained at 6 hours of reaction.

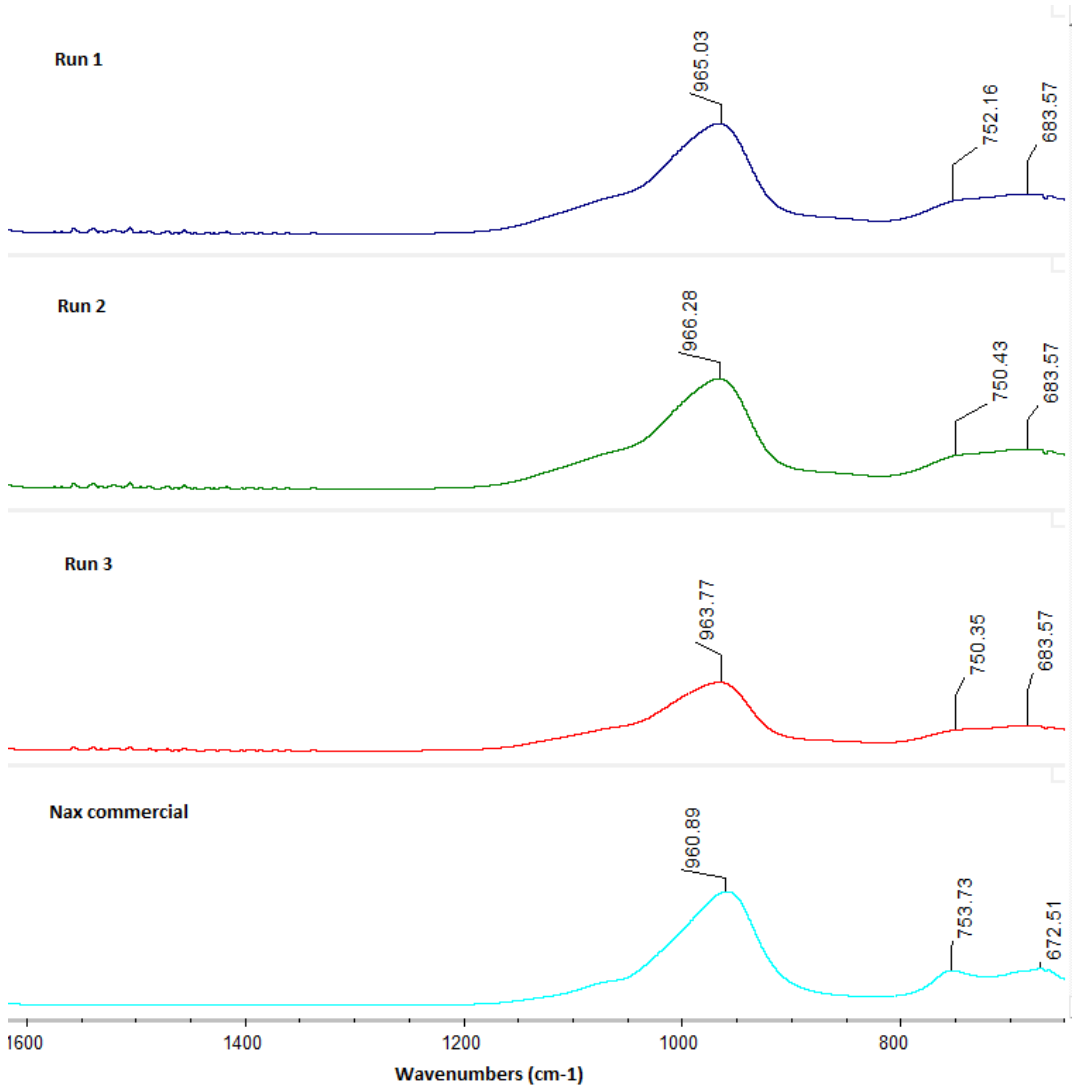


Figure S4. IR spectra collected on different samples (i. e. of different runs) of the synthesized FAU nanocrystals i) obtained at 6 hours of reaction. The IR spectrum obtained from the commercial NaX powder is showed for comparison.