Supporting Information

Continuous-flow synthesis of mesoporous SBA-15

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Materials Synthesis

Conventional SBA-15 mesoporous solid was labelled SBA-15(batch). Synthesised materials produced within our continuous flow setup were labelled SBA-15(flow). Standard flow conditions were 80 °C and 13 min residence time within the tube reactor. Reaction time in a continuous flow reactor equals time over which samples were collected from the tube reactor and residence time that experienced by reactants within the heated tube reactor.

Hydrothermal processing of a 0.35 g sample of isolated SBA-15(flow) was also conducted prior to calcination; the silica was added to 35 ml of deionised water within a sealed PTFE autoclave and heated to 80 °C for 16 h. The resulting solid was isolated by filtration and calcined to remove the surfactant template and designated SBA-15(flow)-HT.

Hydrothermal stability of calcined SBA-15(flow). 0.05 g of calcined SBA-15(flow) was assessed by immersion in 10 ml water at 100 °C for 24 h. The resulting solid was isolated by filtration for characterisation. TEM analysis was conducted on a JEOL 2100 at 200 kV, with image processing using ImageJ 1.41 software. Samples were dispersed in methanol and drop cast on 200-mesh carbon coated copper grids and dried under ambient conditions.

Yield calculation

$$Yeild\ \% = \frac{Obtained\ mass\ of\ SBA-15\ (g)}{Theortetical\ mass\ of\ SBA-15\ (g)} \times 100$$

where the obtained mass of SBA-15 was determined post-calcination.

Productivity calculation

$$Productivity\ (g\ L^{-1}\ h^{-1}) = \frac{Obtained\ mass\ of\ SBA-15\ (g)}{\Sigma\ reagent\ volume\ (L) \times synthesis\ time\ (h)}$$

where productivity calculations are based on the sum of the reagent volumes to allow comparison with existing literature, and synthesis time consists of all steps except calcination, a constant for SBA-15 synthesis protocols.

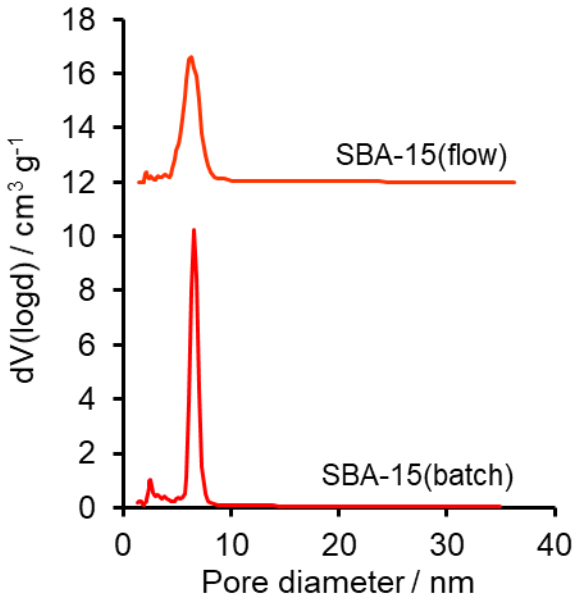

Figure S1. BJH pore size distributions of SBA-15(batch), and SBA-15(flow); distributions are offset for clarity.

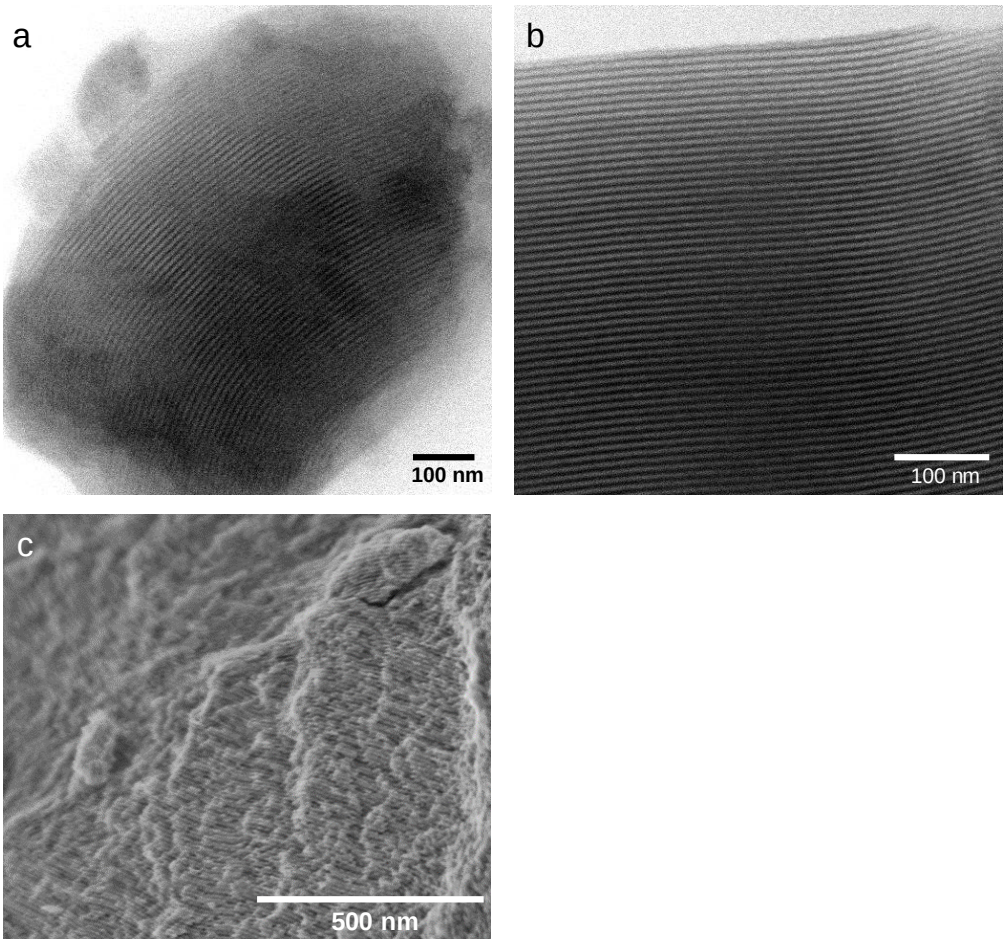

Figure S2. TEM images of (a) SBA-15(flow) and (b) SBA-15(batch), and (c) HR-SEM of SBA-15(flow) evidencing large mesopore domains.

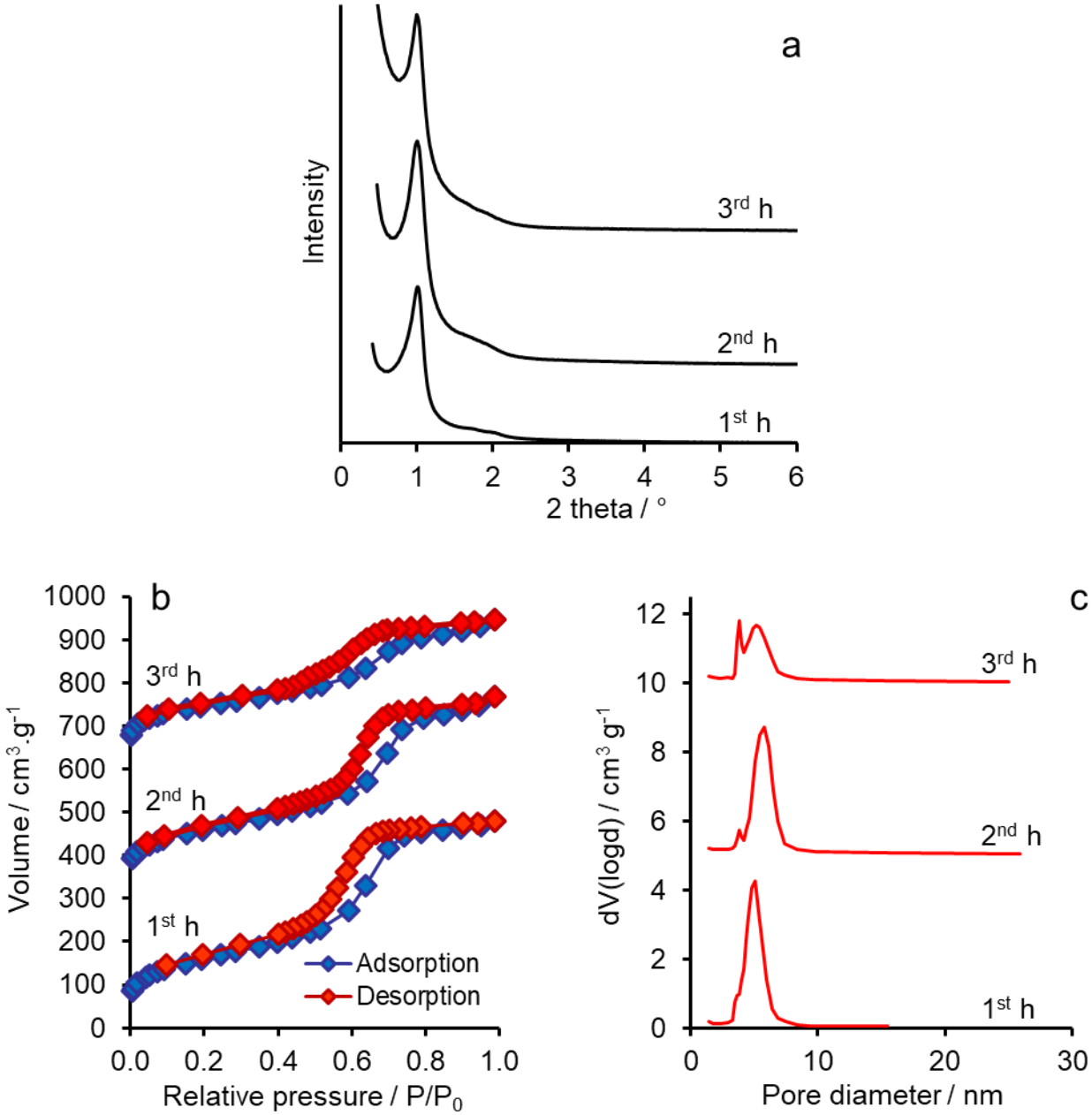

Figure S3. (a) Low angle XRD, (b) N_2 adsorption-desorption isotherms and (c) corresponding BJH pore size distributions for SBA-15(flow) as a function of reaction time. Data offset for clarity.

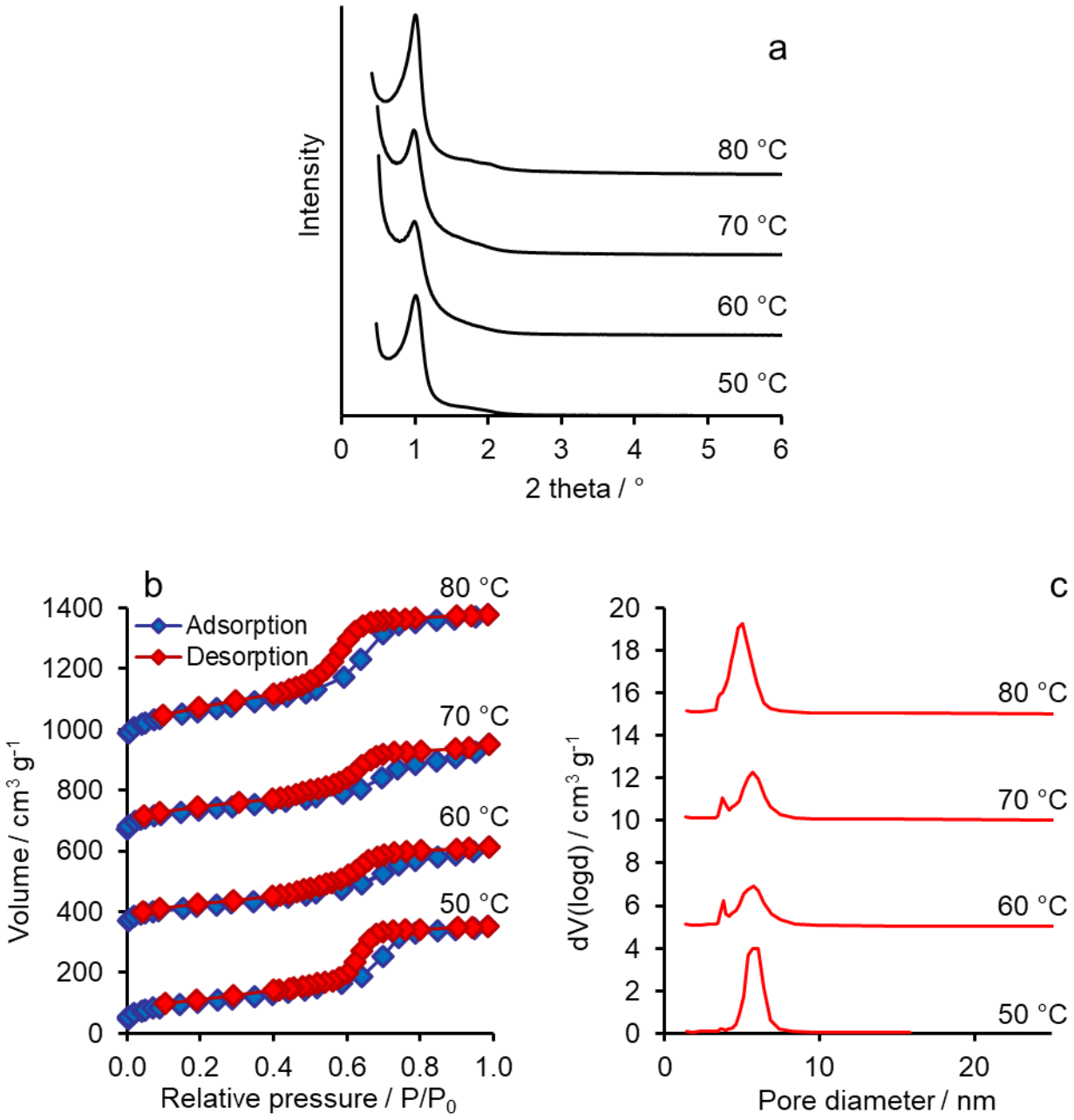

Figure S4. (a) Low angle XRD, (b) N_2 adsorption-desorption isotherms and (c) corresponding BJH pore size distributions for SBA-15(flow) as a function of reaction temperature. Data offset for clarity.

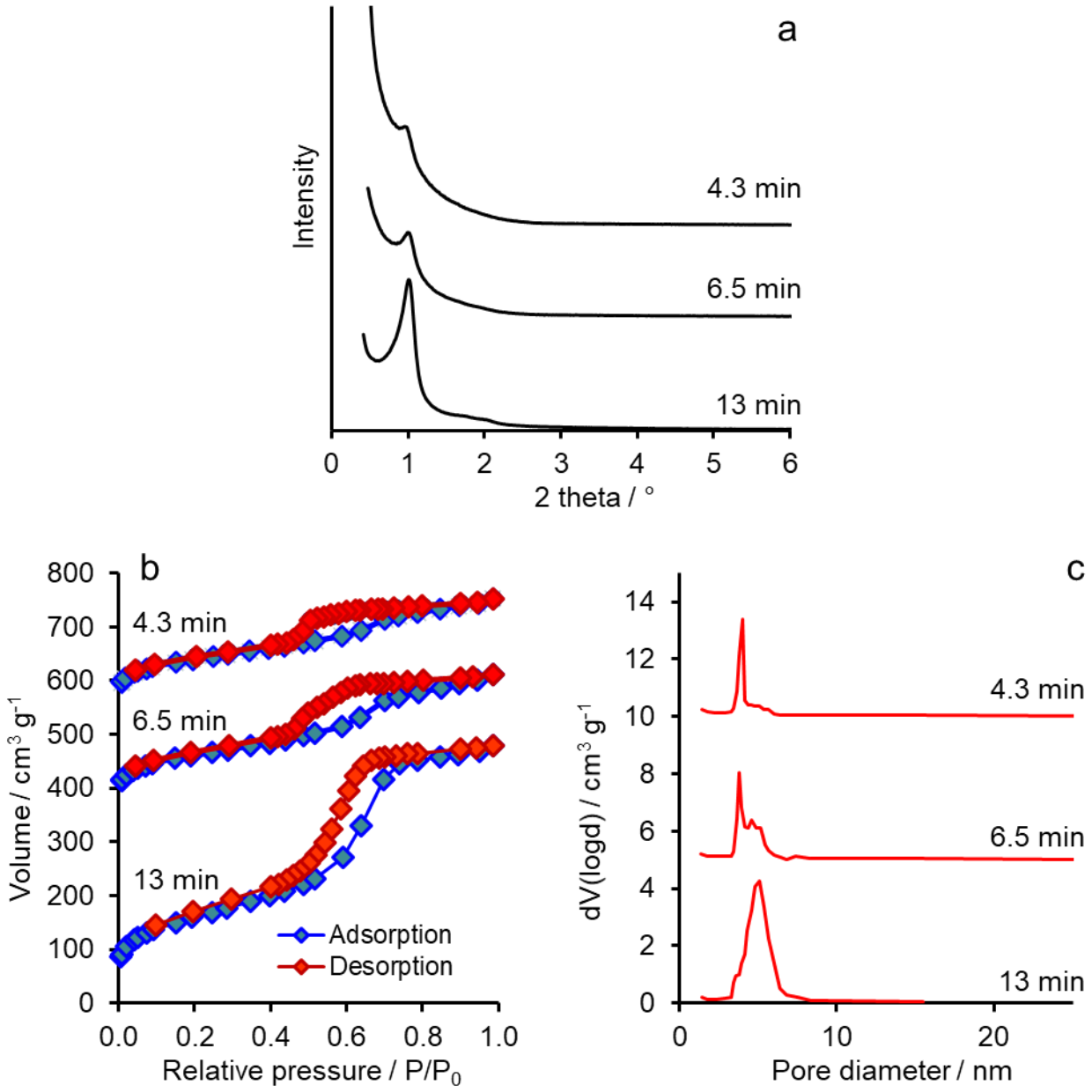

Figure S5. (a) Low angle XRD, (b) N_2 adsorption-desorption isotherms and (c) corresponding BJH pore size distributions for SBA-15(flow) as a function of residence time. Data offset for clarity.

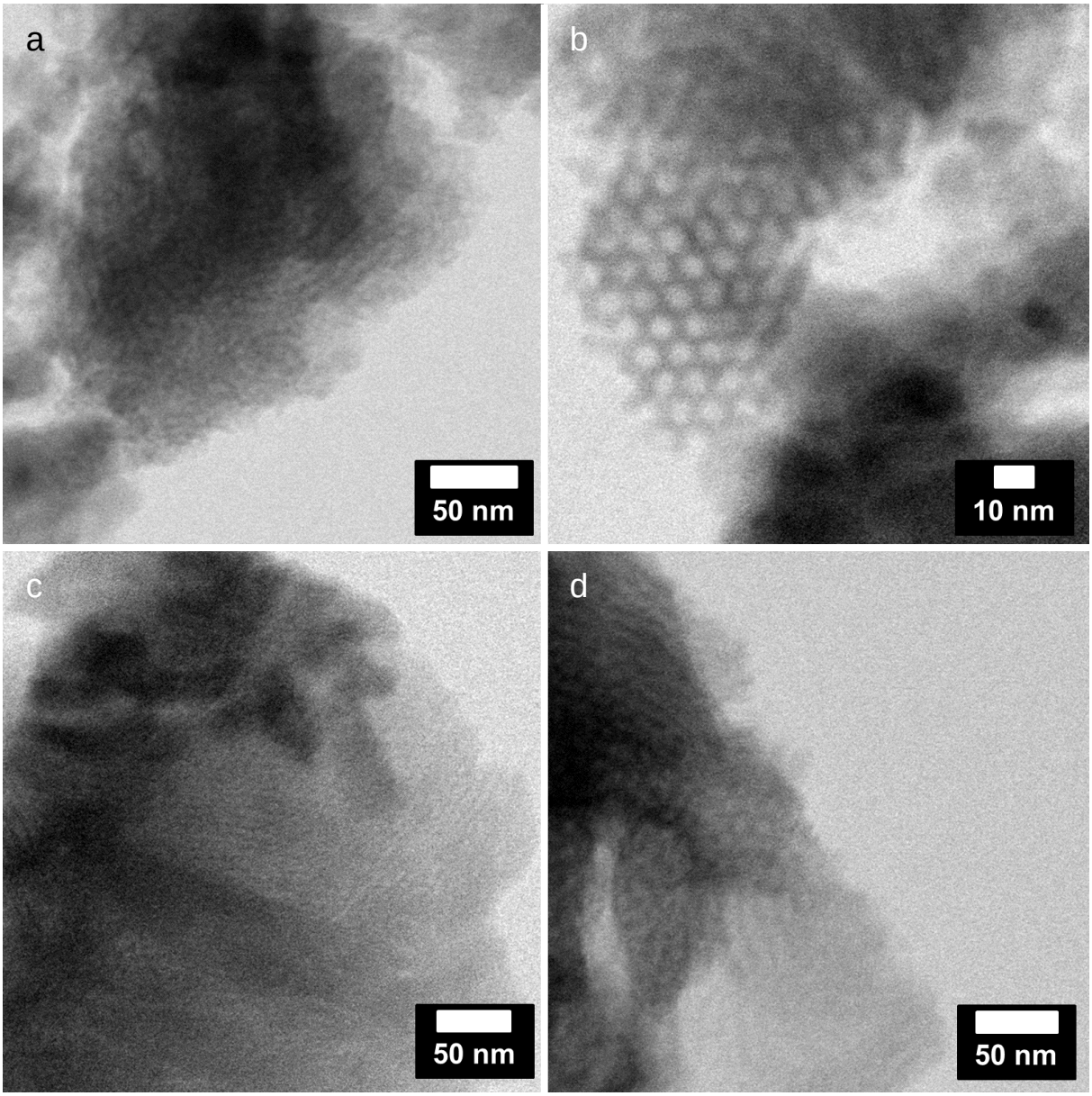

Figure S6. STEM images of SBA-15(flow) as a function of residence time for (a-b) 6.5 min and (c-d) 4.3 min.

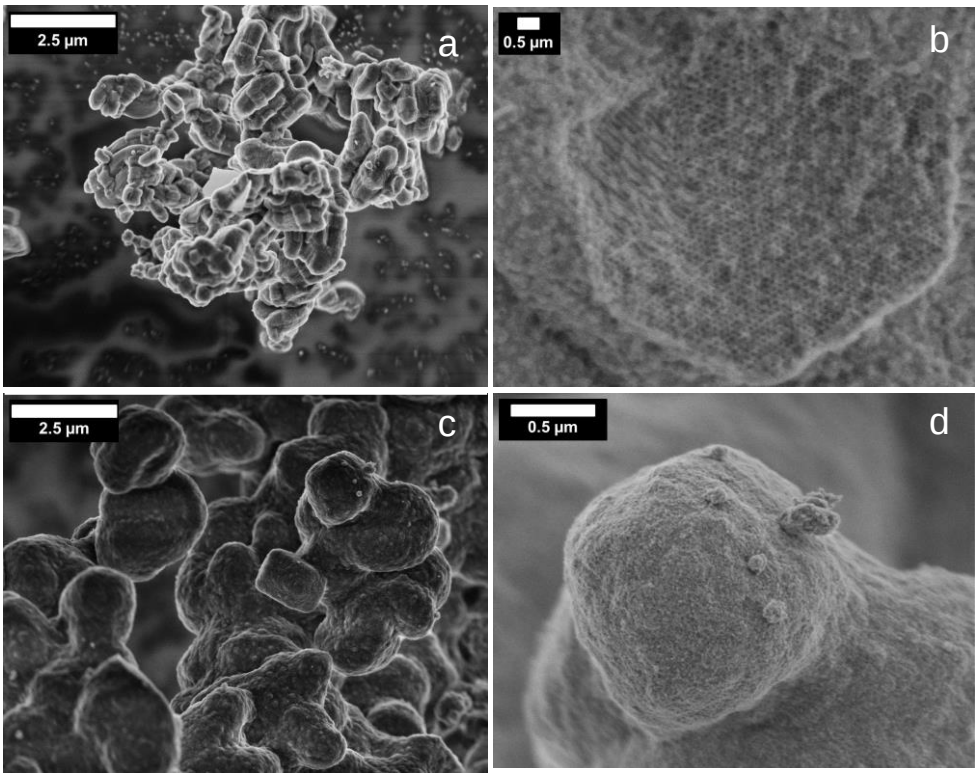

Figure S7. SEM images of SBA-15(flow) as a function of residence time for (a-b) 6.5 min and (c-d) 4.3 min.

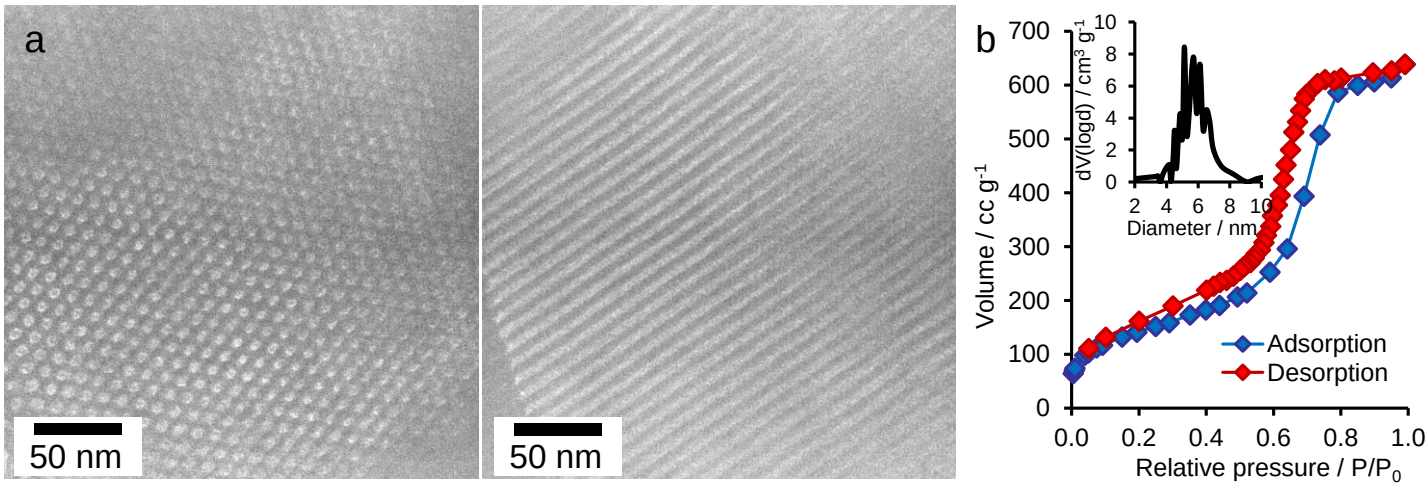

Figure S8. (a) TEM (b) N_2 adsorption-desorption isotherms with inset BJH pore size distribution of calcined SBA-15(flow) after boiling water treatment.

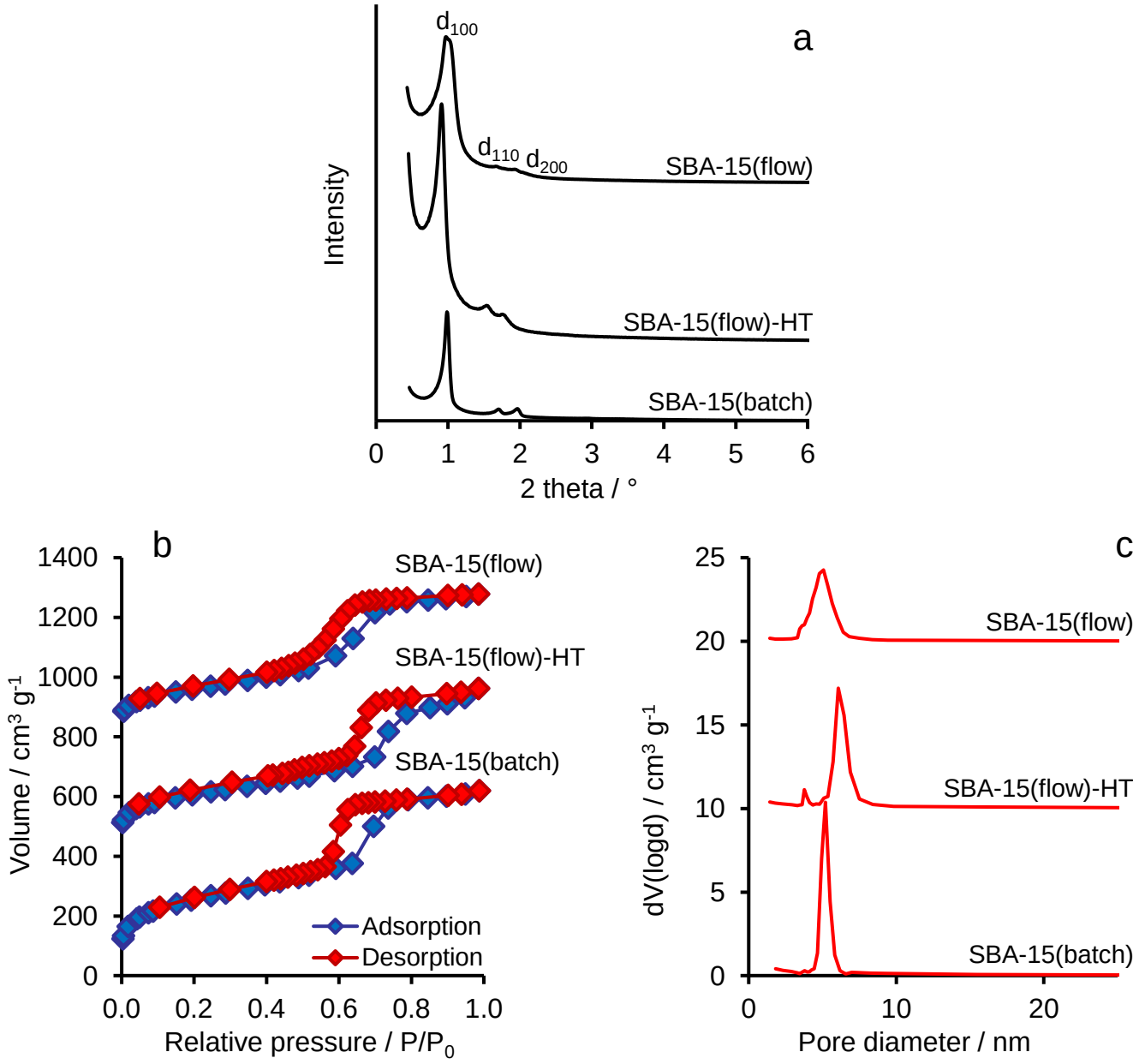

Figure S9. (a) Low angle XRD, (b) N_2 adsorption-desorption isotherms and (c) corresponding BJH pore size distributions for SBA-15(flow) before and after hydrothermal processing and conventional SBA-15(batch). Data offset for clarity.

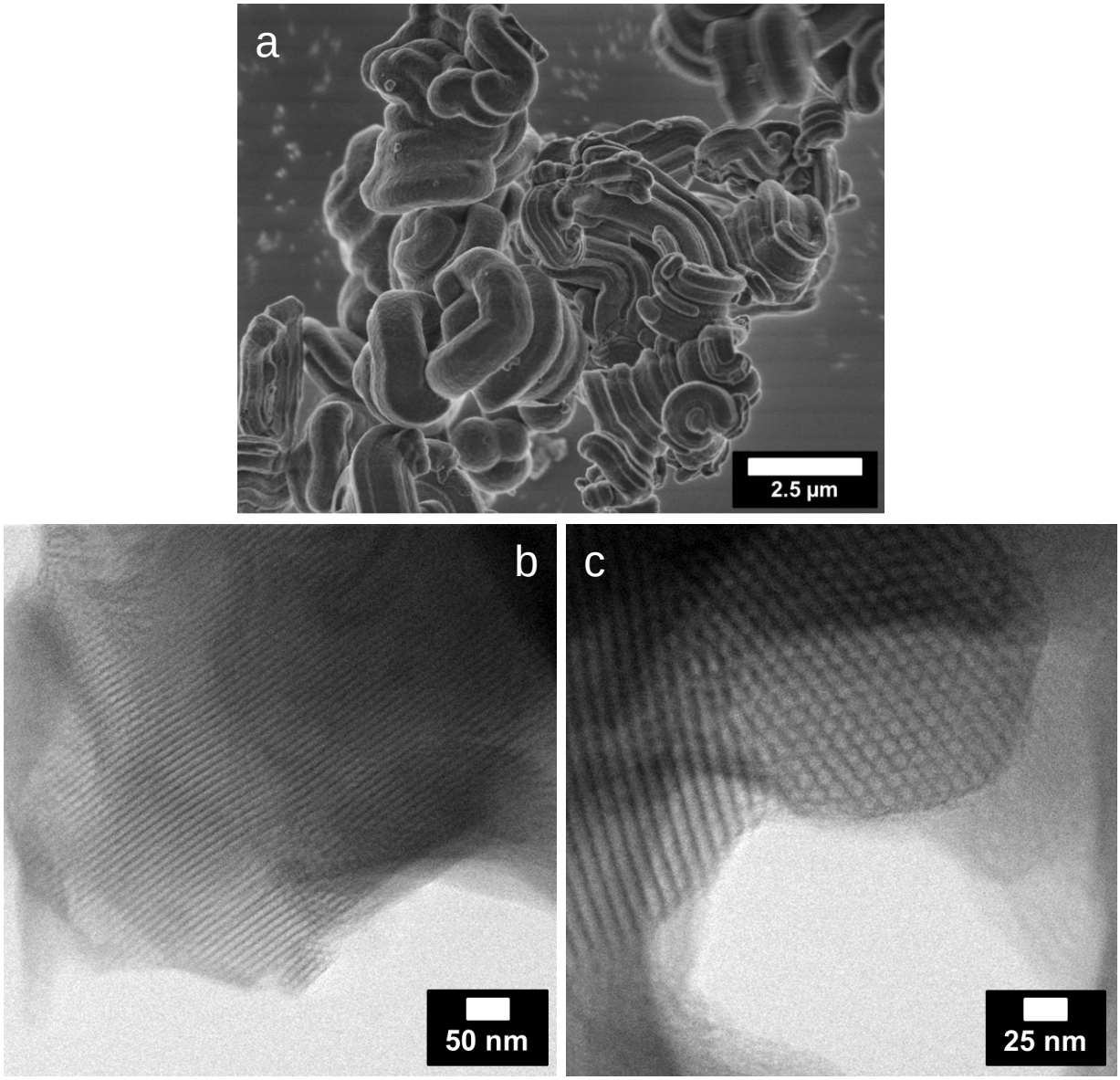

Figure S10. (a) SEM and (b) STEM images of SBA-15(flow)-HT.