

Electronic Supplementary Information

Optimized Ultrafast Flow Synthesis of CON-type Zeolite and Improvement of Its Catalytic Properties

Anand Chokkalingam,^{a#} Kenta Iyoki,^{a#} Naoki Hoshikawa,^a Hiroaki Onozuka,^b Watcharop Chaikittisilp,^{a†} Susumu Tsutsuminai,^b Takahiko Takewaki,^b Toru Wakihara,^{*a,c} and Tatsuya Okubo^{*a}

^a. Department of Chemical System Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan.

^b. Inorganic Materials Laboratory, Science & Innovation Center, Mitsubishi Chemical Corporation, Kamoshida-cho, Aoba-ku, Yokohama 227-8502, Japan.

^c. Institute of Engineering Innovation, The University of Tokyo, 2-11-16 Yayoi, Bunkyo-ku, Tokyo 113-8656, Japan

^{*}Corresponding author Email: wakihara@chemsys.t.u-tokyo.ac.jp, okubo@chemsys.t.u-tokyo.ac.jp Fax: +81-3-5800-3806.

[#]These authors contribute equally. [†]Present address: Research and Services Division of Materials Data and Integrated System, National Institute for Materials Science, 1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan.

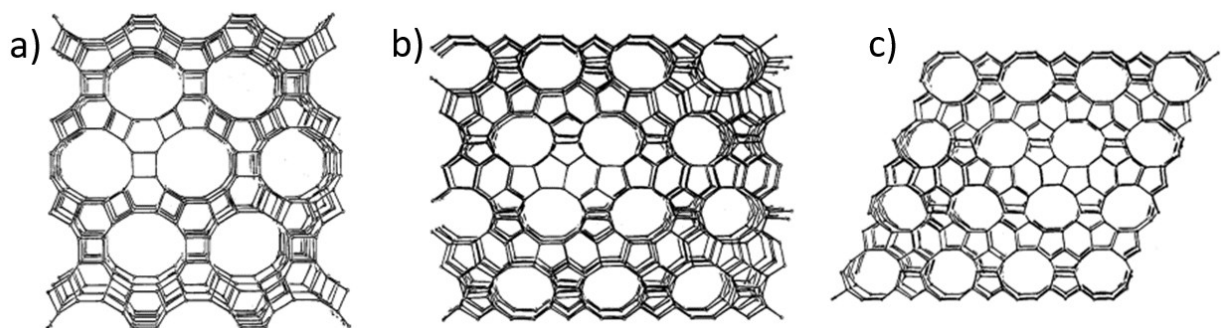


Figure S1. Framework structure of CON, polymorph A viewed along a) 12-ring pores and b) 10-ring pores and c) polymorph B viewed along the 10-ring pores



Figure S2. Tubular reactor

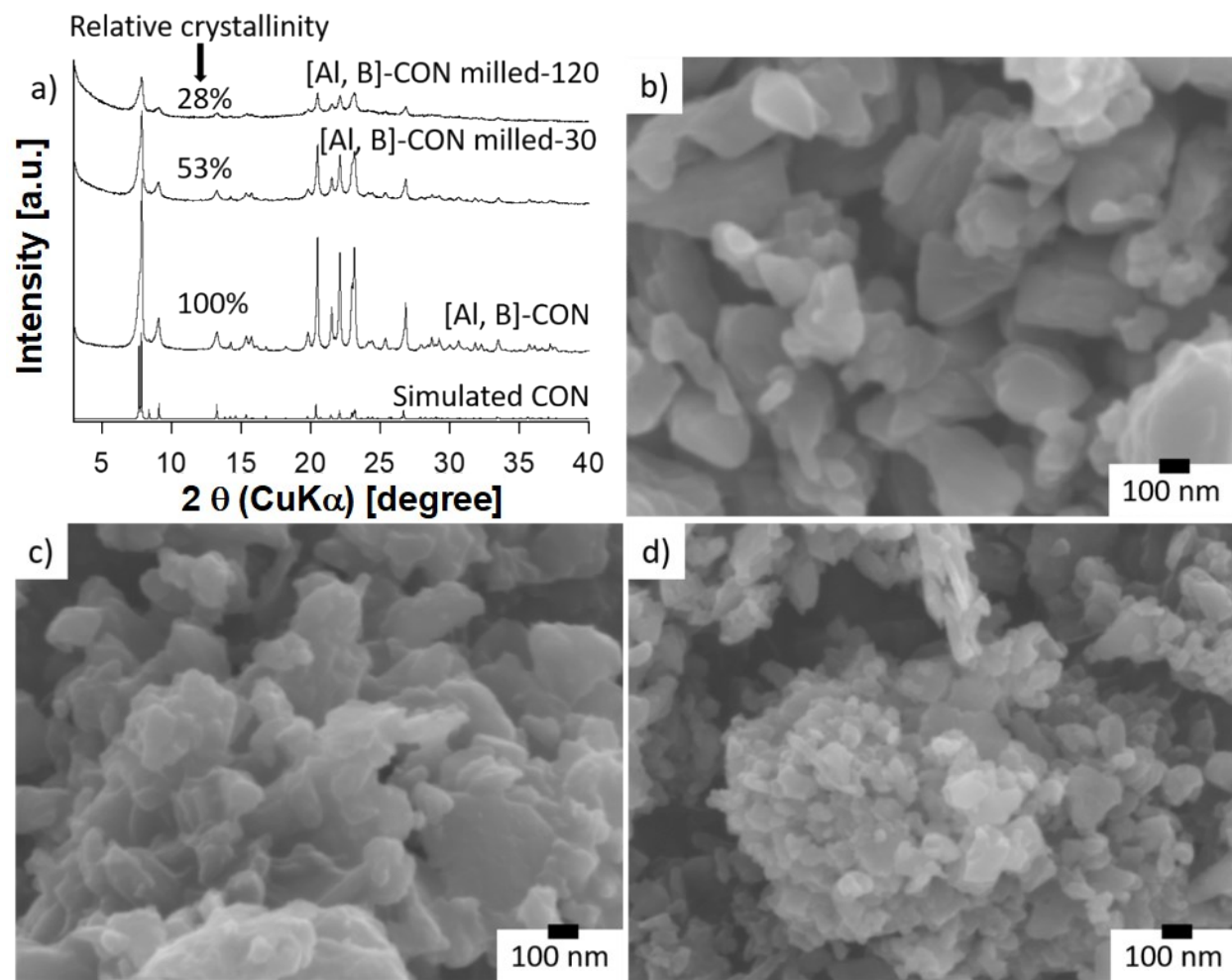


Figure S3. a) XRD patterns and relative crystallinities of [Al, B]-CON, [Al, B]-CONmilled-30 and [Al, B]-CONmilled-120; SEM images of b) [Al, B]-CON, c) [Al, B]-CONmilled-30 and d) [Al, B]-CONmilled-120

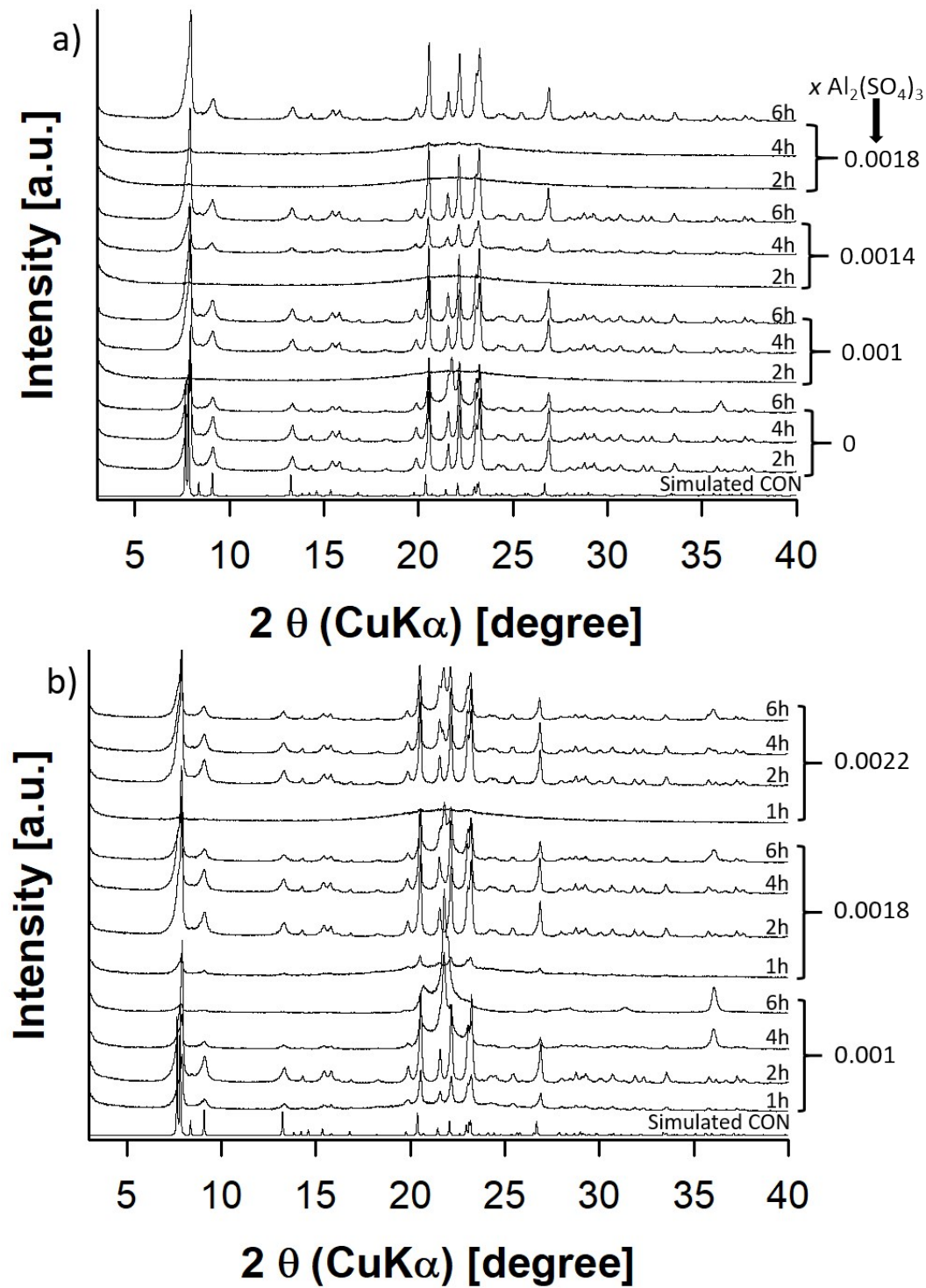


Figure S4. Crystallization curves for different synthesis temperatures; a) 200 and b) 220 °C.

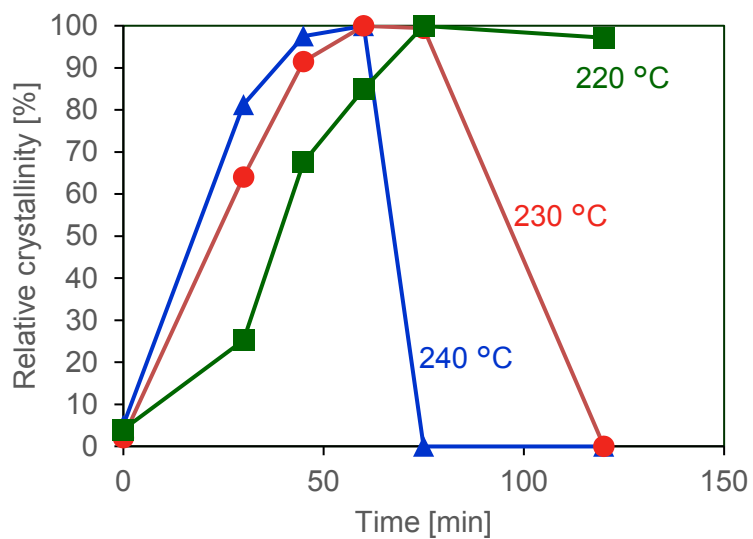


Figure S5. Crystallization curves for different synthesis temperatures. The Figure shows the relative crystallinity of the CON phases as the crystallinity of the overall sample (including cristobalite phase).

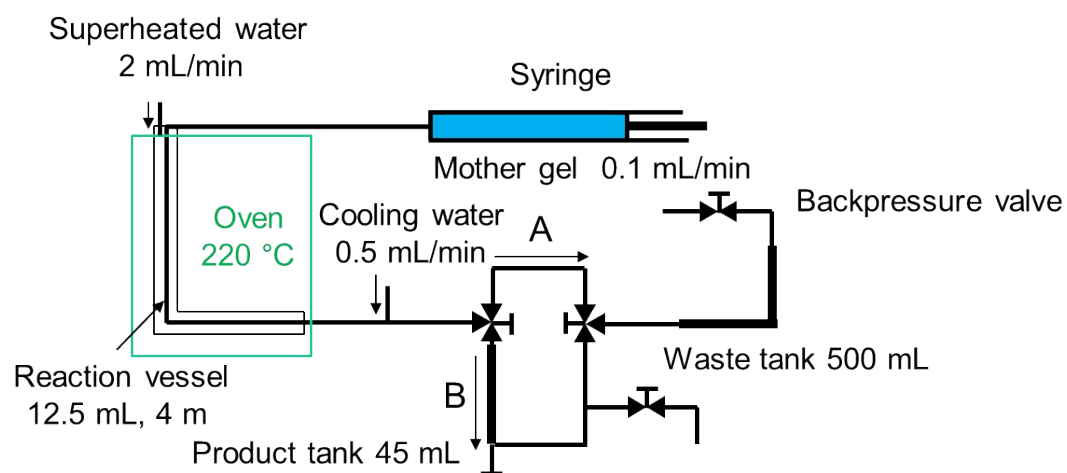
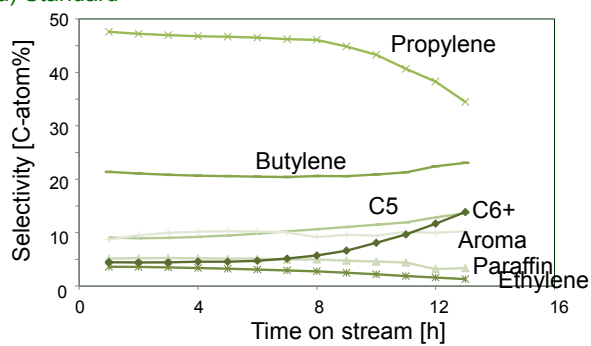
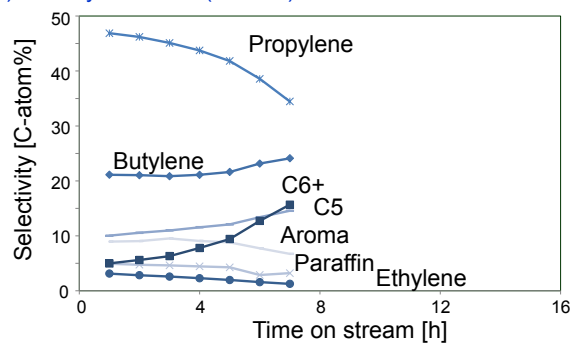


Figure S6. Schematic representation of the continuous flow synthesis

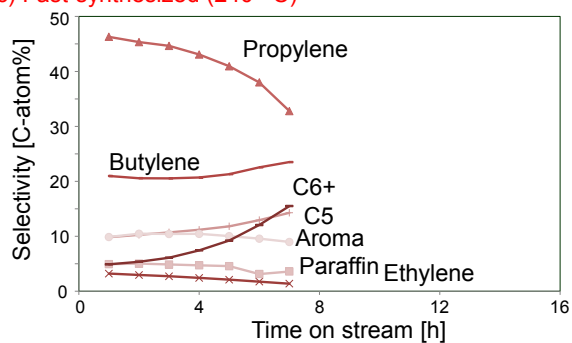
(a) Standard



(b) Fast-synthesized (220 °C)



(c) Fast-synthesized (240 °C)



(d) Alkaline treated, fast-synthesized

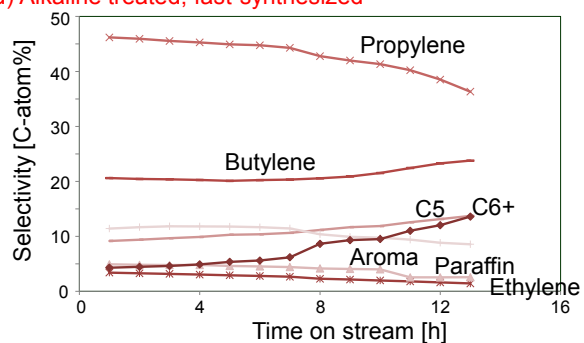


Figure S7. Selectivity on MTO reactions; (a) standard, (b) fast-synthesized (220 °C), (c) fast-synthesized (240 °C), and (d) Alkaline treated, fast-synthesized CON