

Electronic Supplementary Information (ESI)

A facile route to synthesize enduring mesopore containing ZSM-5 catalyst for methanol to propylene reaction

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Preparation of mesopore containing zeolite ZSM-5 (*c.f.*, mesoZSM-5, scheme 1)

Typically, 4 g of as-synthesized SBA-15 (with P123 surfactant inside) was directly calcined at 1173 K for 6 h at a heating rate of 1 K min⁻¹ under Ar. After carbonization process, the SBA-15/carbon composite was immersed into an aqueous solution containing 4.0 g of NaOH and 20 g of deionized water in a flask and refluxed at 368 K for 12 h, followed by addition of certain amount of sulfuric acid, NaAlO₂, TPABr, water and of Na₂SiO₃ according to desired mesoporosity and Si/Al ratio in the resulting mesoZSM-5 materials. The obtained mixture with a molar composition of 1SiO₂:0.003125Al₂O₃:0.09375TPABr:30H₂O was stirred for 12 h and then was transferred to a Teflon-lined autoclave for crystallization at 453 K for 48 h. The product was washed with deionized water and dried at 353 K overnight. Finally the as-synthesized carbon/ZSM-5 composite was calcined in air at 823 K for 6 h to remove the carbon material and organic template. The obtained carbon-free ZSM-5 sample was donated as mesoZSM-5(x), where x=A or B corresponding to different carbon/silica molar ratio during the crystallization process of ZSM-5 zeolite. For comparison, ZSM-5 sample without any addition of carbon template was also synthesized (donated as ZSM-5).

Table S1 Textural properties of as-synthesized SBA-15 calcined under air and Ar

Sample	BET surface area(m ² /g)	Micropore volume(cm ³ /g)	Total pore volume(cm ³ /g)
SBA-15(Air)	780	0.04	1.30
SBA-15 (Ar)	416	0.00	0.72

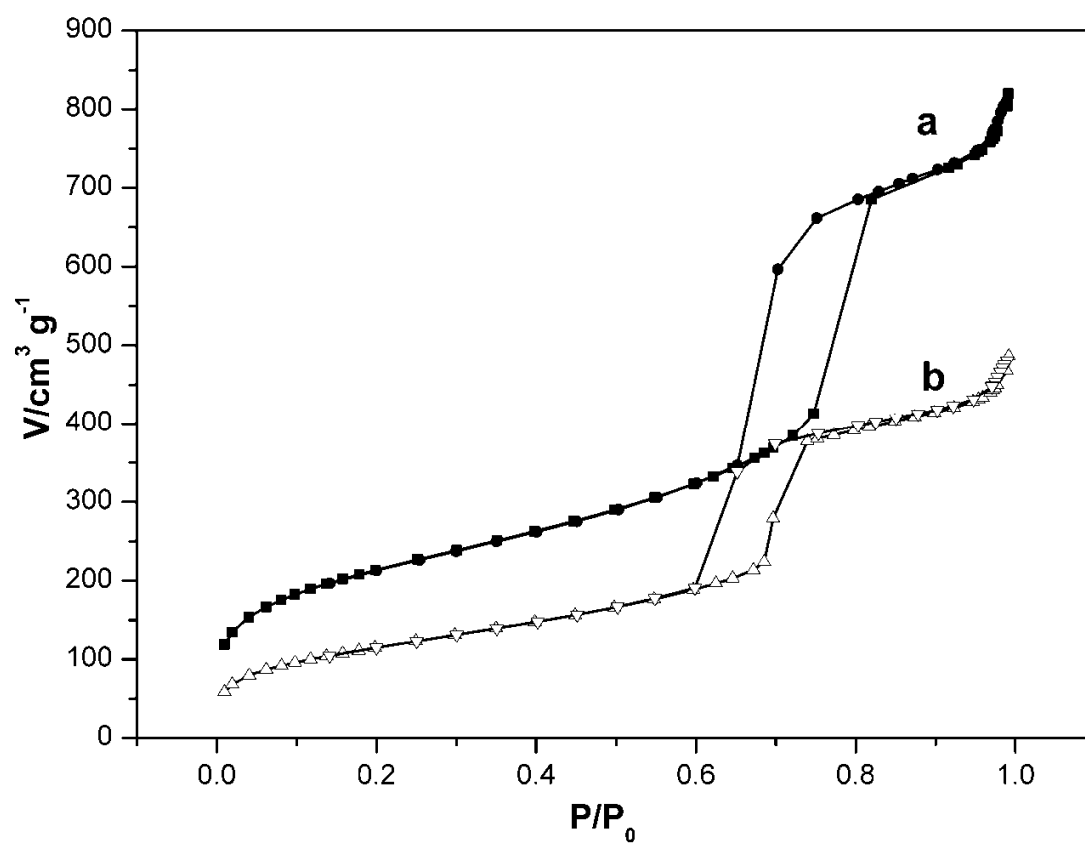


Fig. S1 N_2 sorption isotherms of as-synthesized SBA-15 calcined under air (a) and Ar (b)

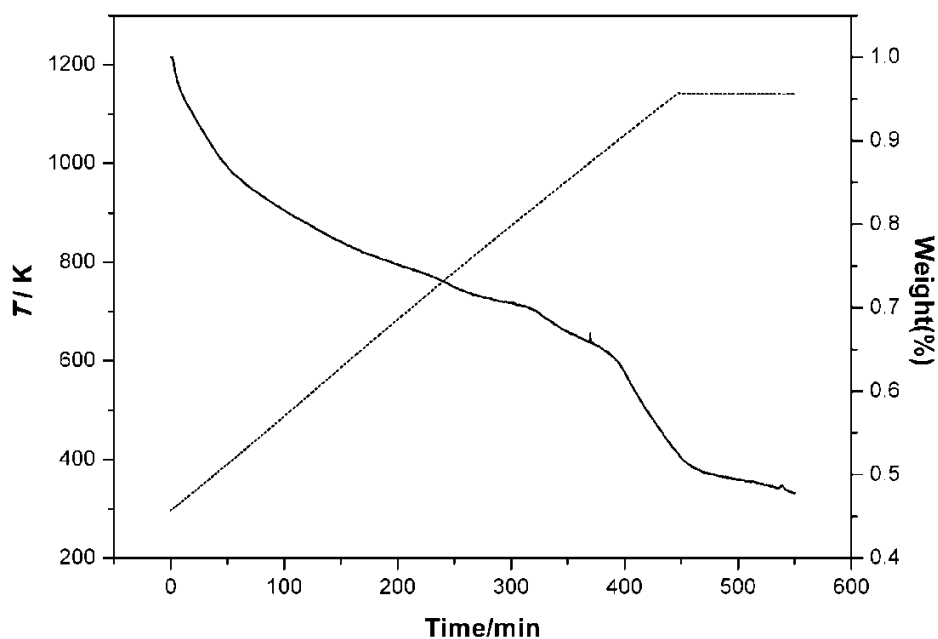


Fig. S2 Thermogravimetric analysis (TGA) analysis of carbonized SBA-15 under air, with a ramping temperature rate of 2 K min^{-1}

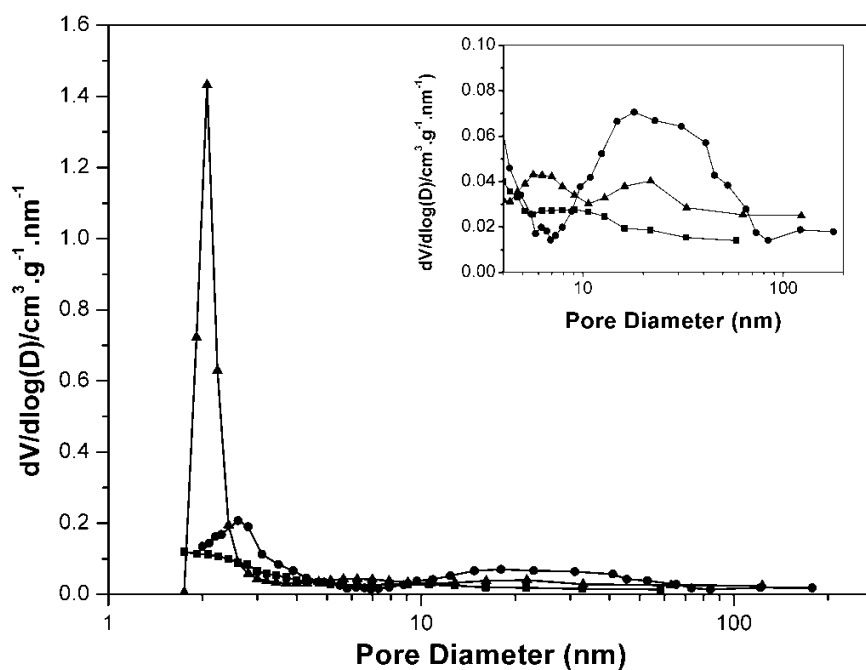


Fig. S3 Pore size distribution of ZSM-5(■), mesoZSM-5A(●), mesoZSM-5B(▲)

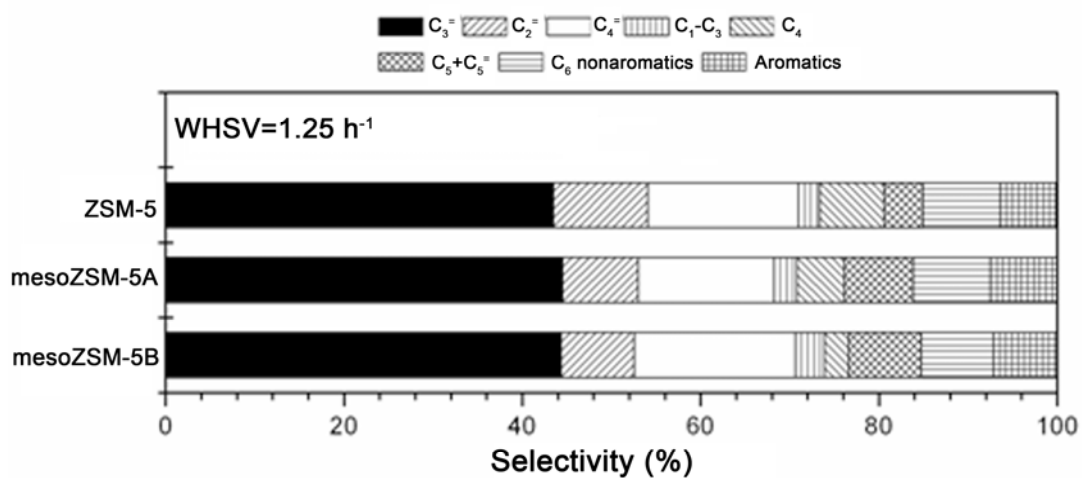


Fig. S4 Initial product selectivity of MTP reaction over ZSM-5, mesoZSM-5A and mesoZSM-5B, reaction conditions: WHSV=1.25 h⁻¹, T=733 K, n(CH₃OH):n(H₂O)=1:5, P_{total}=1 atm