Title: Oxidative desulfurization of DBT with H_2O_2 catalysed by TiO_2/porous glass

Authors: C. Shen[†], Y. J. Wang*[,‡], J. H. Xu[‡], and G. S. Luo*[,‡]

Affiliations:

†Beijing Key Laboratory of Bioprocess, College of Life Science and Technology, Beijing University of Chemical Technology, Beijing 100029, China

‡The State Key Laboratory of Chemical Engineering, Department of Chemical Engineering, Tsinghua University, Beijing 100084, China

Corresponding author: Tel: 86-010-62788568, Fax: 86-010-62788568

Email address: wangyujun@mail.tsinghua.edu.cn and gsluo@tsinghua.edu.cn

Supporting material

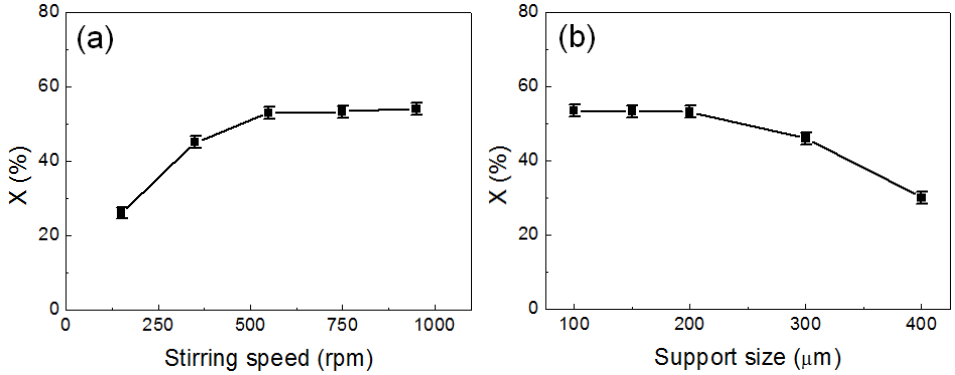


Figure S1. (a) Effect of stirring speed on DBT conversion (support size: 100 μm; Ti content: 3.67 wt.%; reaction temperature: 333 k; 1.0 g catalyst; molar ratio of H_2O_2-to-DBT: 10; initial concentration of DBT: 150 ppm; reaction duration: 1 min); (b) effect of support size on DBT conversion (stirring speed: 750 rpm; Ti content: 3.67 wt.%; reaction temperature: 333 k; 1.0 g catalyst; molar ratio of H_2O_2-to-DBT: 10; initial concentration of DBT: 150 ppm; reaction duration: 1 min)

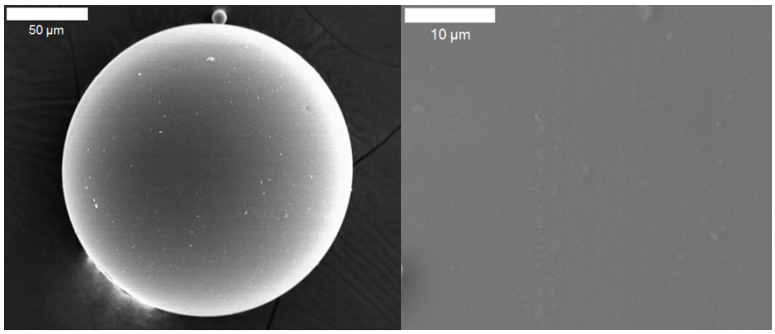


Figure S2. Surface morphologies of glass beads before subcritical water treatment

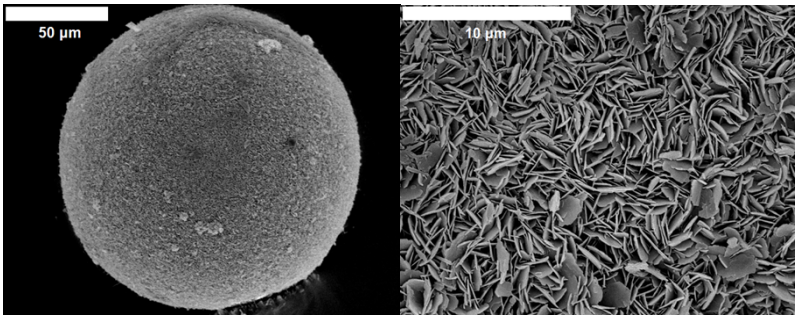


Figure S3. Surface morphologies of glass beads after subcritical water treatment

Table S1. BET results of glass beads before and after the subcritical water treatment

Sample	Surface area (m^2/g)	Pore volume (mL/g)	Mean pore size (nm)
Before treatment	2.9×10^{-3}	/	/
After treatment	162.6	2.58×10^{-1}	6.34

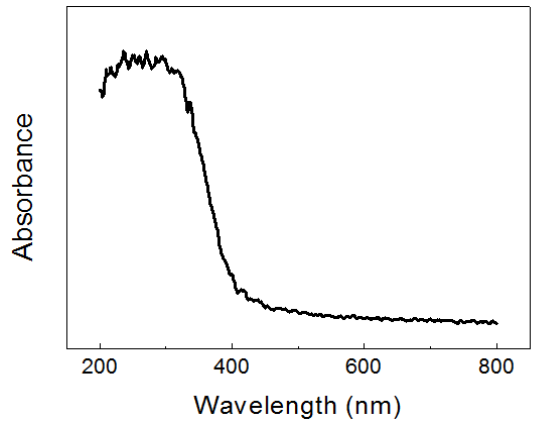


Figure S4. UV-vis absorption spectra of porous glass supported with TiO_2

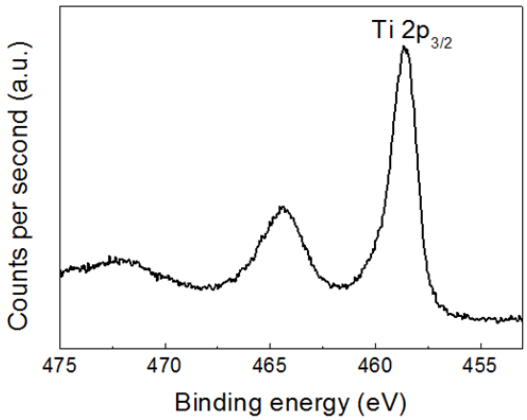


Figure S5. XPS spectra of the TiO_2-decorated porous glass beads

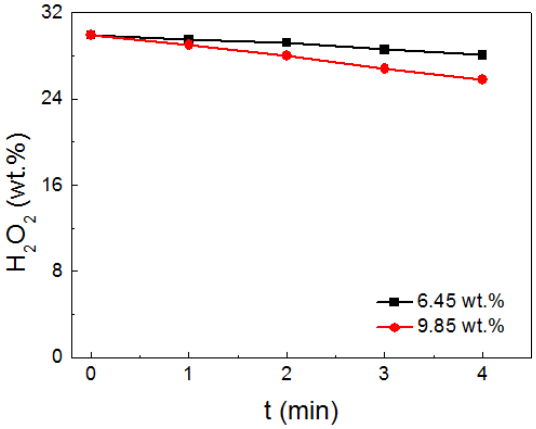


Figure S6. H_2O_2 decomposition rate using catalysts with different Ti content

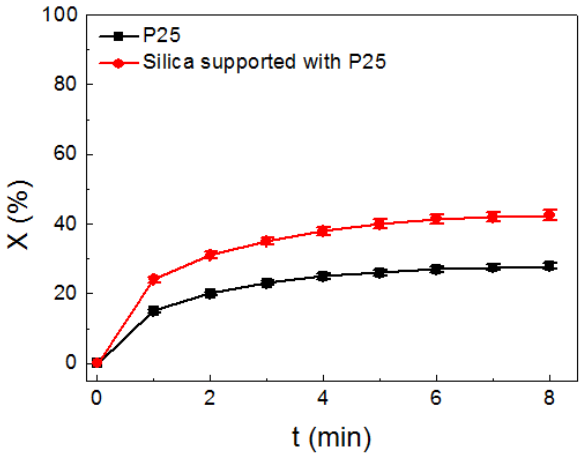
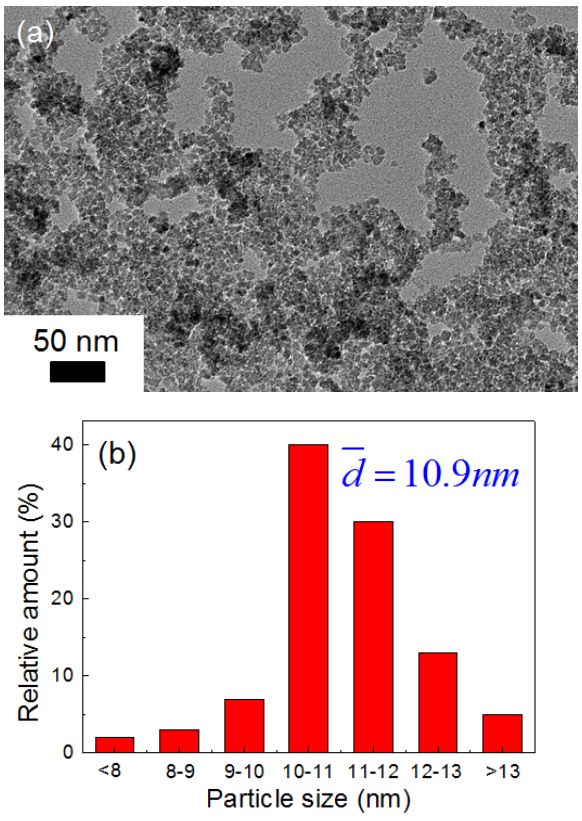


Figure S7. Catalytic activity of P25 and silica supported with P25; reaction temperature: 333 k; TiO_2 amount: 0.1 g; molar ratio of H_2O_2-to-DBT: 10; initial concentration of DBT: 150 ppm

Preparation of TiO_2 powder:

12.5 mL of $Ti(OBu)_4$ was added to 33.3 mL of ethanol and the solution was stirred for 10 min. Then a certain amount of concentrated hydrochloric acid was added (the pH value of the solution was 1.6) and stirred for another 30 min. The mixture of 16.7 mL of ethanol and 1.5 mL of deionized water was added dropwise afterwards. Then the mixture was stirred for another 3 h at 353 K to form the gel and calcined at 773 K for 2 h with a heating speed of 1 K/min.



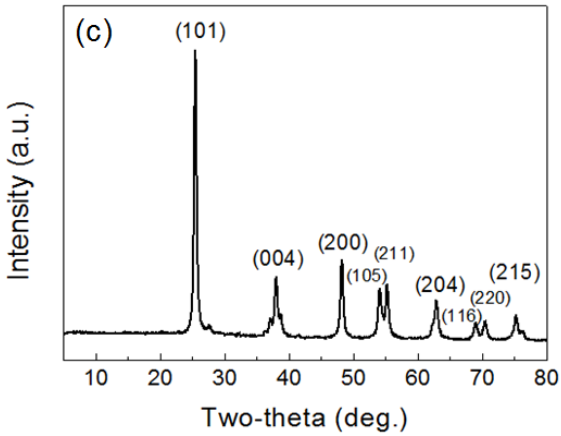


Figure S8. (a) TEM image of the as-prepared TiO_2 powder; (b) corresponding histogram of particle size distribution of the as-prepared TiO_2 powder; (c) XRD pattern of the as-prepared TiO_2 powder