Supplementary Information for:

Relationship between the molecular structure of V_2O_5/TiO_2 catalysts and the reactivity of SO_2 oxidation

Authors: Peidong Ji[a], Xiang Gao[a, *], Xuesen Du[a, b], Chenghang Zheng[b], Zhongyang Luo[a], Kefa Cen[a]

Affiliations: [a] State Key Laboratory of Clean Energy Utilization, Zhejiang University，Hangzhou 310027，China

[b] Key Laboratory of Low-grade Energy Utilization Technologies & Systems of Ministry of Education of China, College of Power Engineering, Chongqing University, Chongqing 400044, China

Xiang Gao * (corresponding author),

Address: State Key Laboratory of Clean Energy Utilization, Zhejiang University，No.38 Zheda Road, Hangzhou, Zhejiang PRC 310027 P.R., China.

Tel: +86-13505711887

Fax: +86-571-87951616

Email: xgao1@zju.edu.cn

The temperature dependence of the oxidation of SO_2 to SO_3 was investigated as shown in Fig. S1. The SO_2 oxidation reaction rates over V_2O_5/TiO_2 catalysts were calculated in the temperature range 300-400 °C, where the SO_2 conversion is less than 20%. The data were analyzed by assuming a simplified plug-flow reactor model and a rate equation first order in SO_2 and zero order in O_2. According to the pseudo-first-order rate constant of SO2 oxidation, k_{SO_2}, can be expressed as follows [1]:

$$k_{SO_2} = -\frac{Q}{V_c}\frac{T+273}{273}\ln(1-X_{SO_2})$$

where Q is the total gas flow rate (ml/s (NTP)), V_c is the total catalyst volume (ml), and X_{SO_2} is the SO_2 conversion.

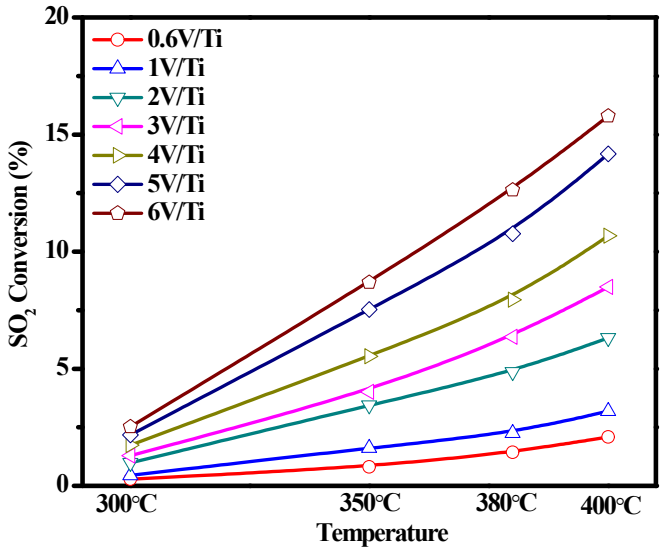

Fig. S1. SO_2 conversion of V_2O_5/TiO_2 catalysts as a function of vanadia loading and reaction temperature.

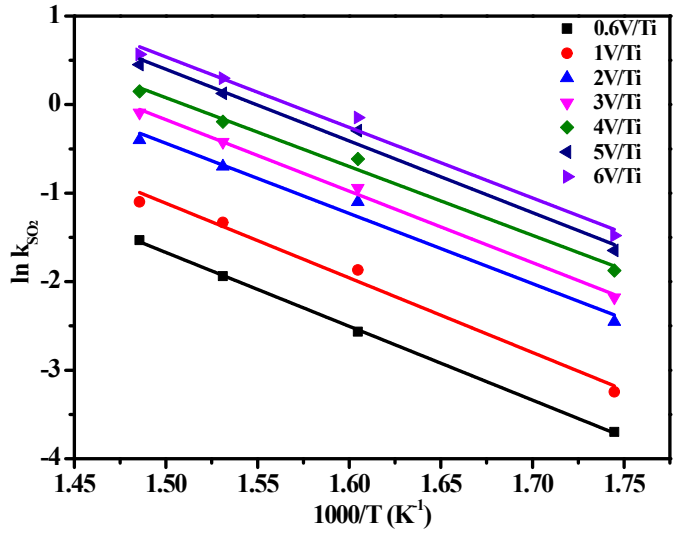

Fig. S2. Arrhenius plots of the SO_2 oxidation reaction rates of V_2O_5/TiO_2 catalysts with different vanadia loading.

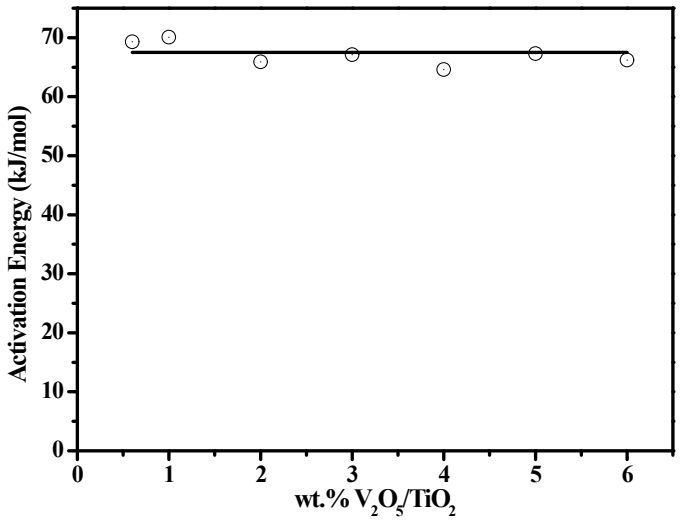

Fig. S3. Activation Energy of SO_2 oxidation of V_2O_5/TiO_2 catalysts with different vanadia loading.

References:

1. J. Svachula, L. J. Alemany, N. Ferlazzo, P. Forzatti, E. Tronconi and F. Bregani, *Ind. Eng. Chem. Res.*, 1993, 32, 826-834