

## Al–O–Ti electron bridge in Cr–TiAlO<sub>x</sub>: Dual–functional catalysis for coupled N<sub>2</sub>O

### utilization and styrene production

Yulin Li\*, Shiyong Zong, Xiaohui Sun, Xiaolong Zhen, Jian Wang, Zhuyin Sui, Xiufeng Xu\*

School of Chemistry and Chemical Engineering, Yantai University, Yantai 264005, China

\*Corresponding authors.

E–mail address: liyulin@ytu.edu.cn (Y. Li), xxf@ytu.edu.cn (X. Xu).

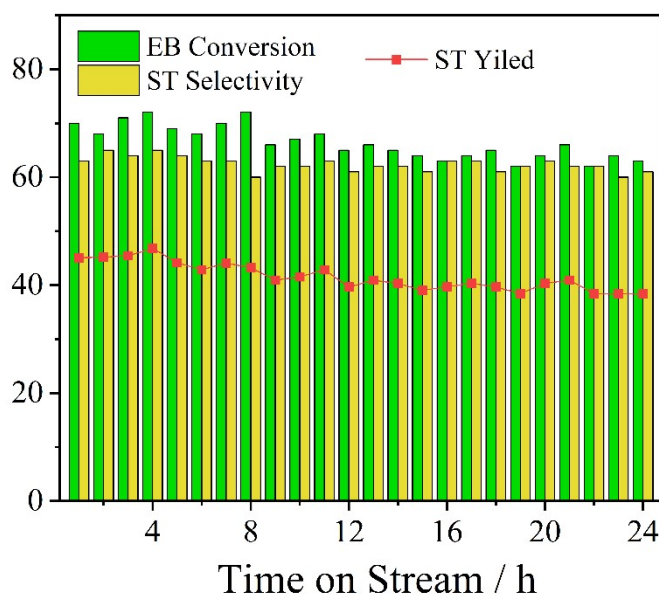


Fig. S1 Catalyst stability of the Cr–6TiAlO<sub>x</sub>–600 catalyst.

Table S1 EB conversion and styrene selectivity at respective temperatures and GHSV for EB oxidative dehydrogenation.

|                              | Temperature / °C | Oxidants              | Conversion of EB / % | Selectivity of ST / % | GHSV /h <sup>-1</sup> | Ref              |
|------------------------------|------------------|-----------------------|----------------------|-----------------------|-----------------------|------------------|
| Mg-Cr-Fe-O                   | 500              | N <sub>2</sub> O      | 45                   | 55                    | 22000                 | [1]              |
| K-FZ30                       | 560              | N <sub>2</sub> O      | 26                   | 85                    | 3600                  | [2]              |
| Fe-SBA15                     | 550              | N <sub>2</sub> O      | 37                   | 89                    | 3000                  | [3]              |
| VO <sub>x</sub> /SBA15       | 500              | N <sub>2</sub> O      | 30                   | 86                    | 3000                  | [4]              |
| <b>Cr–6TiAlO<sub>x</sub></b> | <b>500</b>       | <b>N<sub>2</sub>O</b> | <b>72</b>            | <b>65</b>             | <b>6000</b>           | <b>This work</b> |

## References

- [1] P. Kuśtrowski, L. Chmielarz, A. Rafalska-Łasocha, B. Dudek, A. Pattek-Janczyk, R. Dziembaj. Catalytic reduction of  $N_2O$  by ethylbenzene over novel hydrotalcite-derived Mg–Cr–Fe–O as an alternative route for simultaneous  $N_2O$  abatement and styrene production, *Catal. Commun.* 7 (2006) (12) 1047-1052.
- [2] M. Khatamian, A. A. Khandar, M. Haghghi, M. Ghadiri. Nano ZSM-5 type ferrisilicates as novel catalysts for ethylbenzene dehydrogenation in the presence of  $N_2O$ , *Appl. Surf. Sci.* 258 (2011) 865-872.
- [3] P. Kuśtrowski, L. Chmielarz, J. Surman, E. Bidzińska, R. Dziembaj, P. Cool, E. F. Vansant. Catalytic Activity of MCM-48-, SBA-15-, MCF-, and MSU-Type Mesoporous Silicas Modified with  $Fe^{3+}$  Species in the Oxidative Dehydrogenation of Ethylbenzene in the Presence of  $N_2O$ , *J. PHYS. CHEM. A.* 109 (2005) (43), 9808-9815.
- [4] P. Kuśtrowski, Y. Segura, L. Chmielarz, J. Surman, R. Dziembaj, P. Cool, E. F. Vansant.  $VO_x$  supported SBA-15 catalysts for the oxidative dehydrogenation of ethylbenzene to styrene in the presence of  $N_2O$ , *Catal. Today.* 114 (2006) 307-313.