Electronic Supplementary Material (ESI) for Catalysis Science & Technology

Supporting Information

Sulphated Yttria-Zirconia as a regioselective catalyst system for the alcoholysis of epoxides

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Preparation of Catalysts:

The catalyst was prepared by mixing aqueous solutions of yttrium nitrate and zirconyl nitrate in the appropriate mole ratio to which aqueous ammonia (28%) was added under vigorous stirring until a pH of the solution reached to 8.5 and precipitate was formed. Washing with deionized water, drying at 110° C for 24 h. further treating with sulfuric acid (4 M), drying at 120° C and subsequent calcinations of 500° C for 3 h. resulted in a highly acidic material.

Thermogravimetric analysis:

The thermal stability of the prepared sample was investigated by a TGA method. The thermogram obtained for the sulphated yttria-zirconia is presented in Fig. 5. Thermogravimetric analysis (TGA) was carried out at 10° C min^{-1}. The TGA profile was characterized by weight loss till 223° C. The weight loss occurs at 67° C to 223° C (9.15 % weight loss). Further upto 600° C catalyst show good thermal stability and no remarkable weight loss were observed.

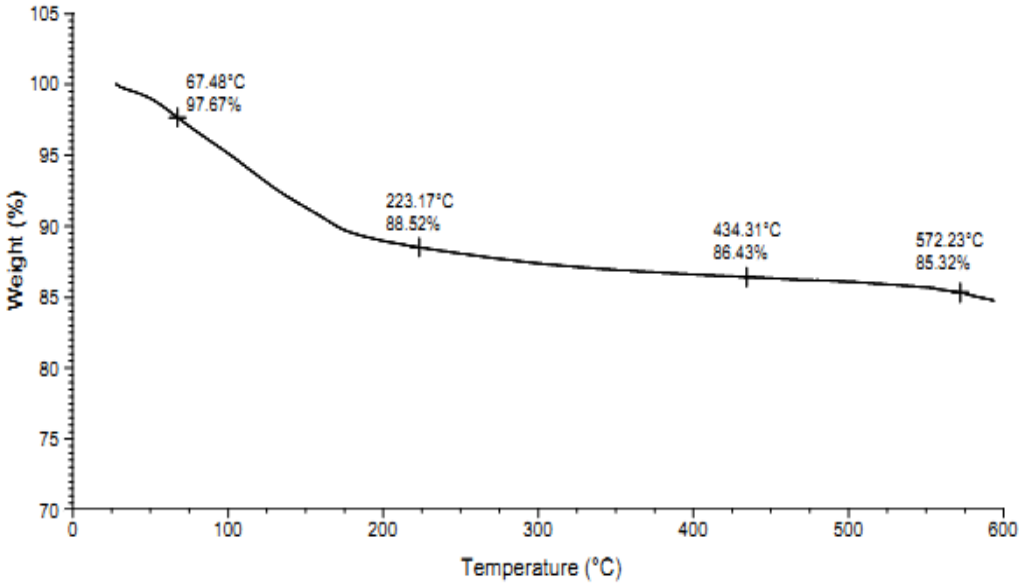

Figure 1. Thermogravimetric analysis curve for $SO_4^{2-}/Y_{0.16}Zr_{0.84}O_2$ catalyst.

Potentiometric titrations for acidity measurement:

Potentiometric titrations were carried out by using Equip-tronic model (EQ-614A) instruments. Catalysts were dried at 120° C for 2 h., prior to use for titrations. The 0.1 g of catalysts amount dispersed in acetonitrile as non-aqueous solvent and stirred for 1 h. Further the catalyst titrated with 0.05 M solution of n-butylamine in acetonitrile. The initial electrode potential (E_i) indicates the maximum acid strength of the sites, and the end point value in mmol/g of n-butylamine, indicates the total number of acid sites.

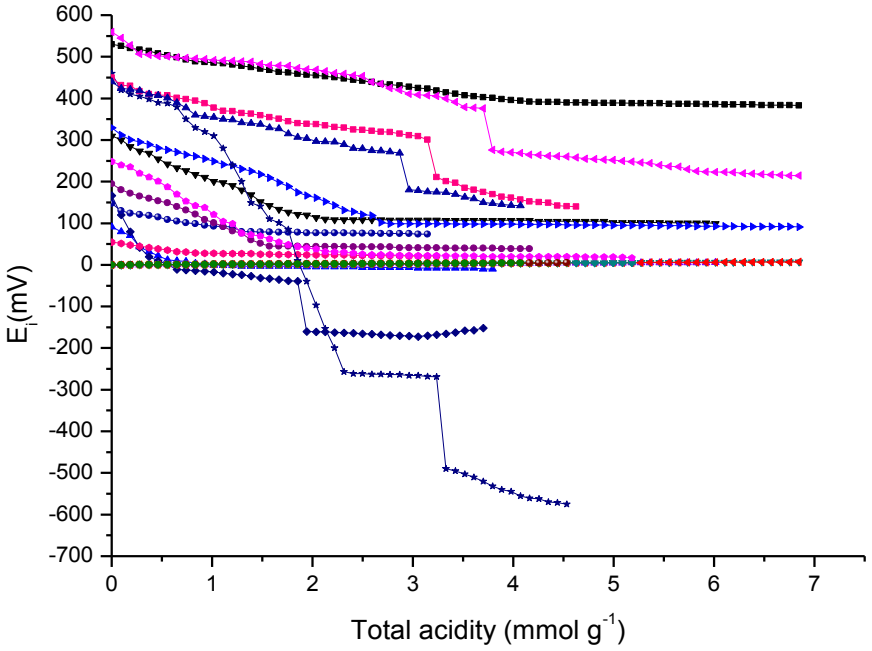

Figure 2. Potentiometric titration curves for all the mixed oxides and surface modified mixed oxides used in the study of epoxide ring opening reaction **(Please See table no. 1).**

X-Ray diffraction analysis:

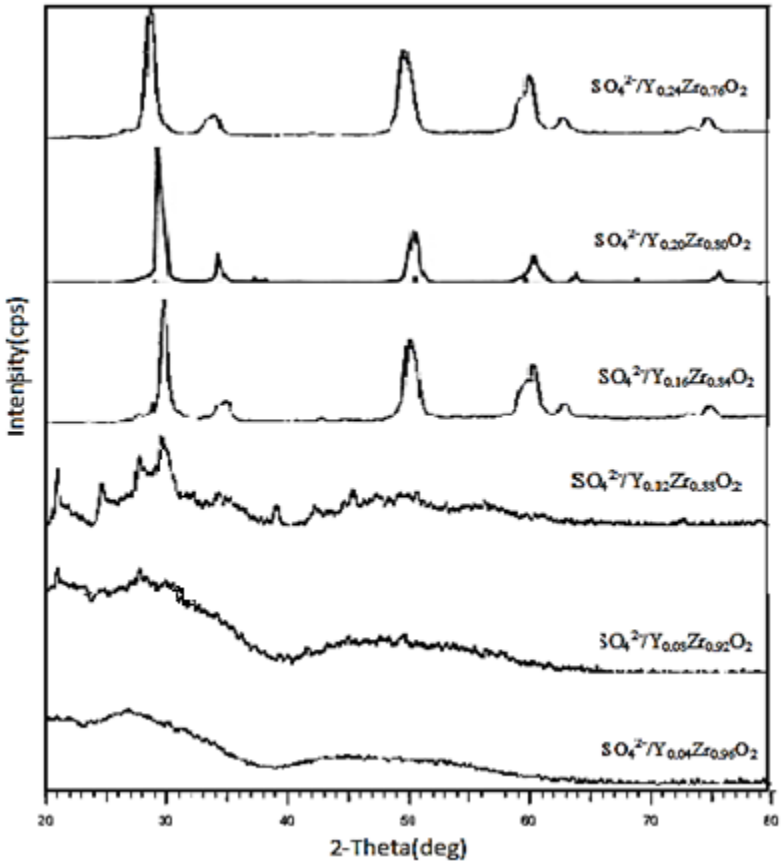

Figure 3 X-ray diffraction analysis of different compositions of sulphated yttria-zirconia catalysts.

FT-IR analysis

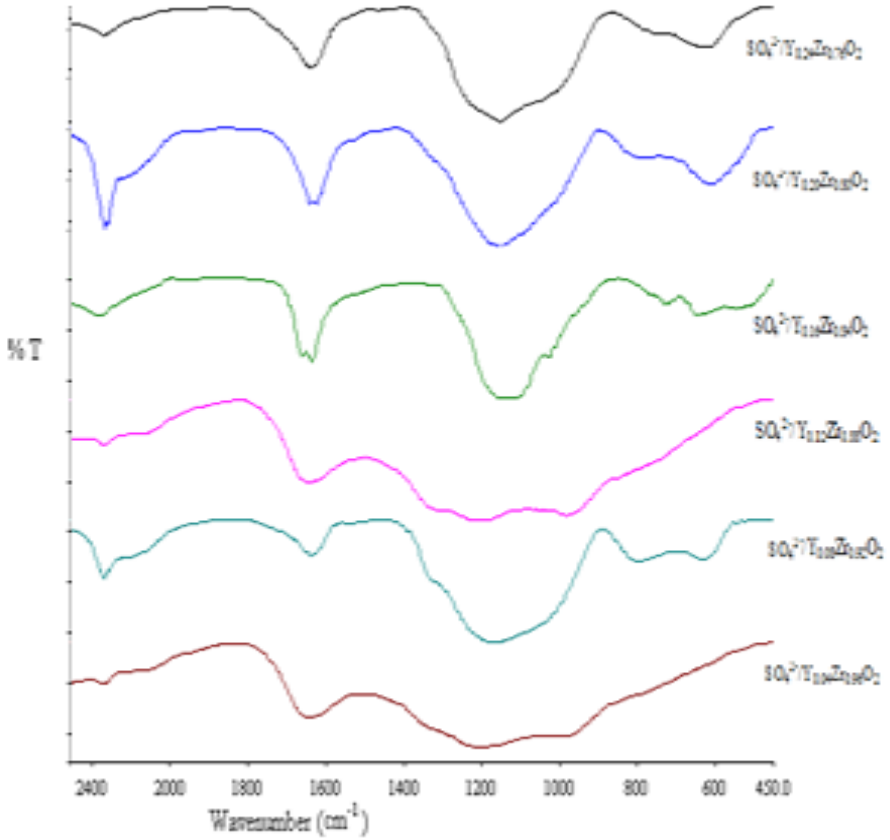

Figure 4 FT-IR analysis of different compositions of sulphated yttria-zirconia catalysts.