

Electronic Supplementary Information (ESI)

Fe-doped SnO₂ catalysts with both BA and LA sites: facile preparation and biomass carbohydrates conversion to methyl lactate MLA

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This section includes:

Fig. S1 to S12, Table S1, Table S2

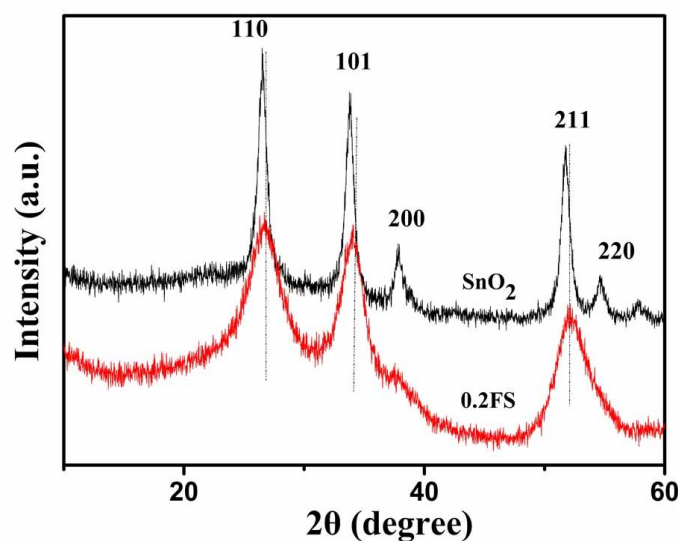


Fig.S1: X-ray diffraction patterns of SnO₂ and 0.2FS

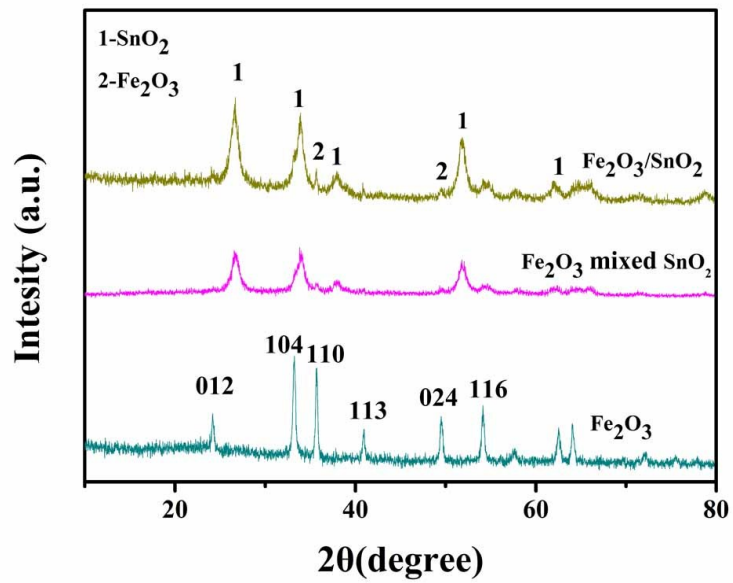


Fig.S2: X-ray diffraction patterns of Fe_2O_3 , $\text{Fe}_2\text{O}_3/\text{SnO}_2$, Fe_2O_3 mixed SnO_2

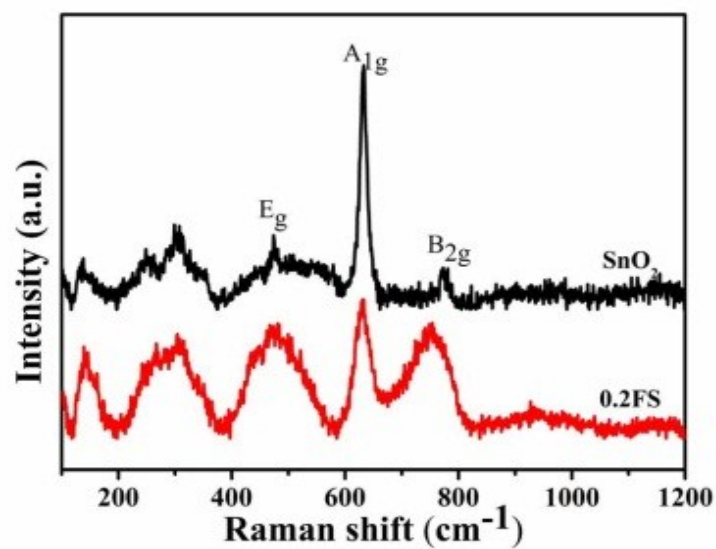


Figure S3. Raman spectra of SnO₂ and 0.2FS

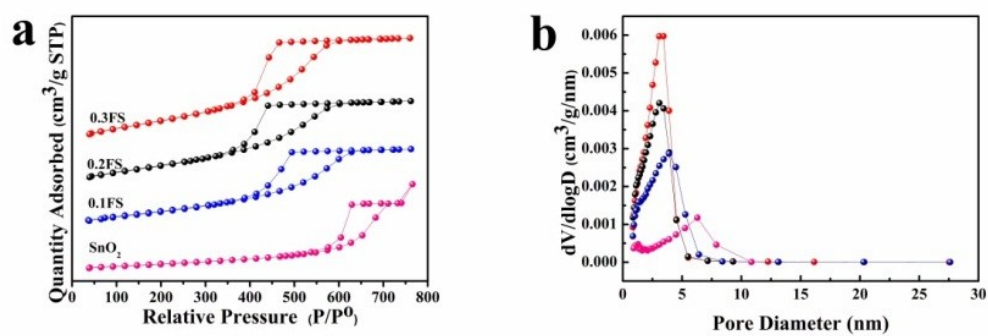


Fig.S4: N₂ adsorption-desorption isotherms(a) and BJH (Barrett-Joyner-Halenda) pore size distribution curves(b) of undoped and Fe-doped SnO₂ catalysts

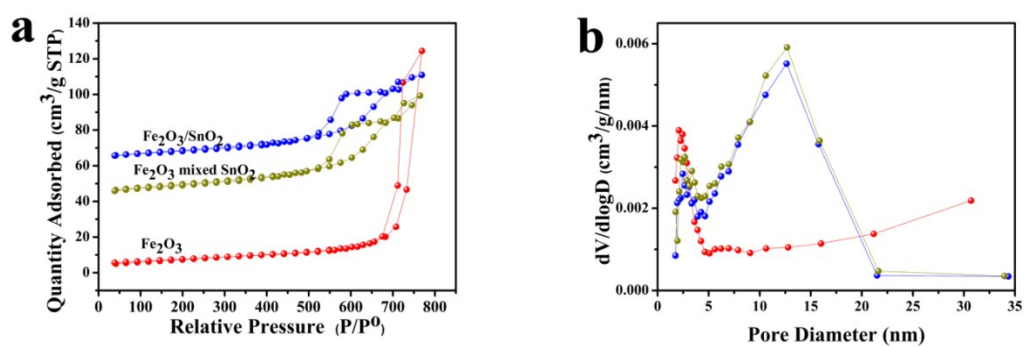


Fig.S5: N_2 adsorption-desorption isotherms(a) and BJH (Barrett-Joyner-Halenda) pore size distribution curves(b) of Fe_2O_3 , Fe_2O_3 / SnO_2 and Fe_2O_3 mixed SnO_2

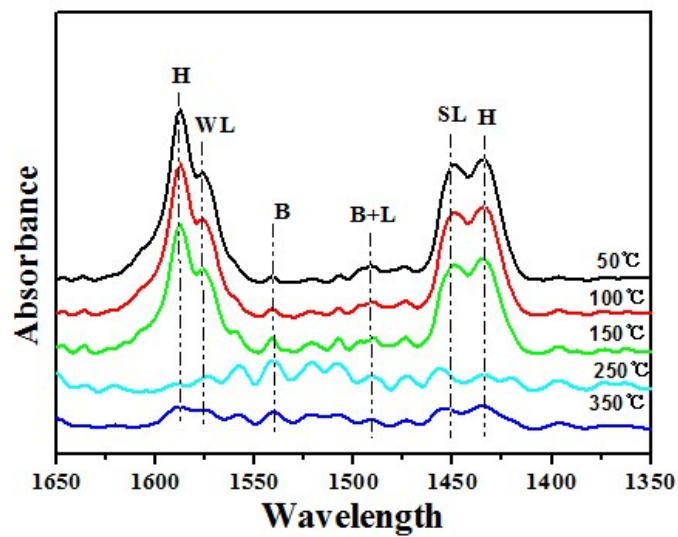


Fig.S6: Py-IR Spectra at different desorption temperatures of 0.2FS

Table S1: The content of L acid and B acid and catalytic performance of different catalyst samples

| Catalyst | L (mmol/g) | B (mmol/g) | Glucose Conversion (%) | MLA Yield (%) |
|---|------------|------------|------------------------|---------------|
| SnO ₂ | 58.81 | 0.57 | 87 | 3 |
| Fe ₂ O ₃ | 138.31 | 2.09 | 93 | 4 |
| Fe ₂ O ₃ /SnO ₂ | 10.89 | 1.68 | 91 | 5 |
| Fe ₂ O ₃ mixed SnO ₂ | 12.54 | 1.77 | 86 | 3 |
| 0.1FS | 138.22 | 1.98 | 93 | 10 |
| 0.2FS | 177.36 | 6.20 | 98 | 35 |
| 0.3FS | 254.18 | 0.27 | 96 | 31 |

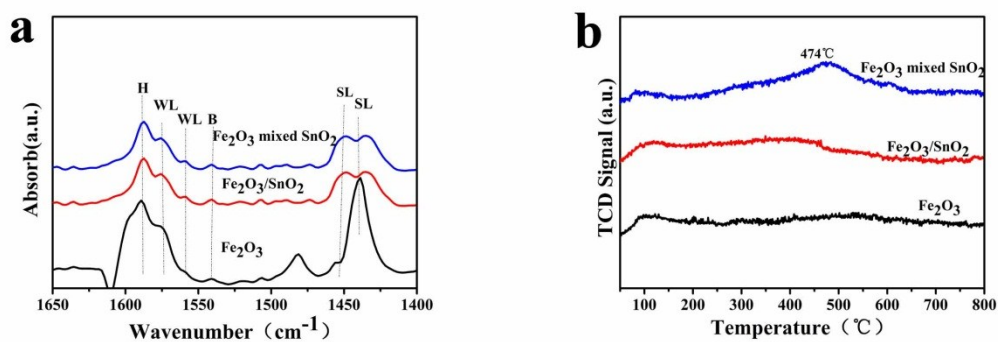


Fig.S7: The Py-IR images (a) and NH₃-TPD profiles (b) of Fe₂O₃, Fe₂O₃ / SnO₂ and Fe₂O₃ mixed SnO₂

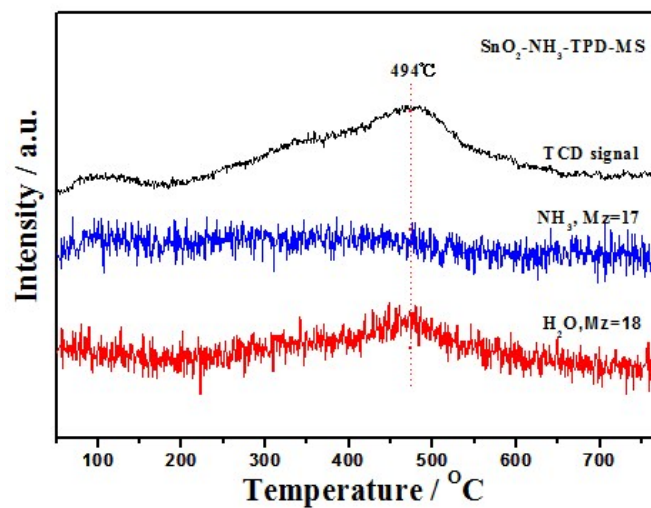


Fig.S8: NH_3 -TPD-MS images of SnO_2

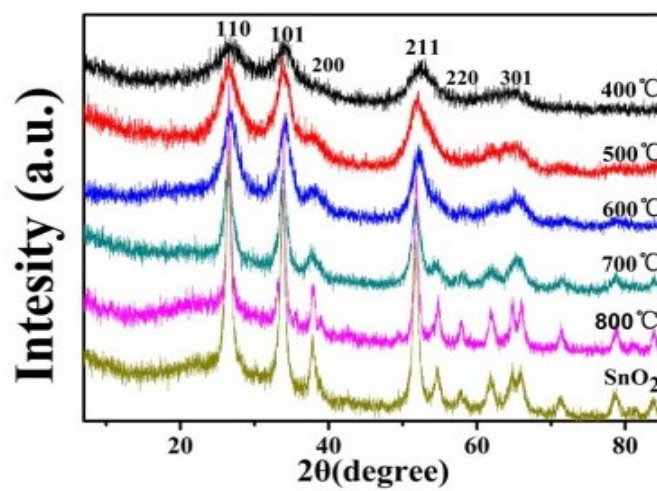


Fig. S9. X-ray diffraction patterns of Fe-doped SnO_2 catalyst annealed at different temperature

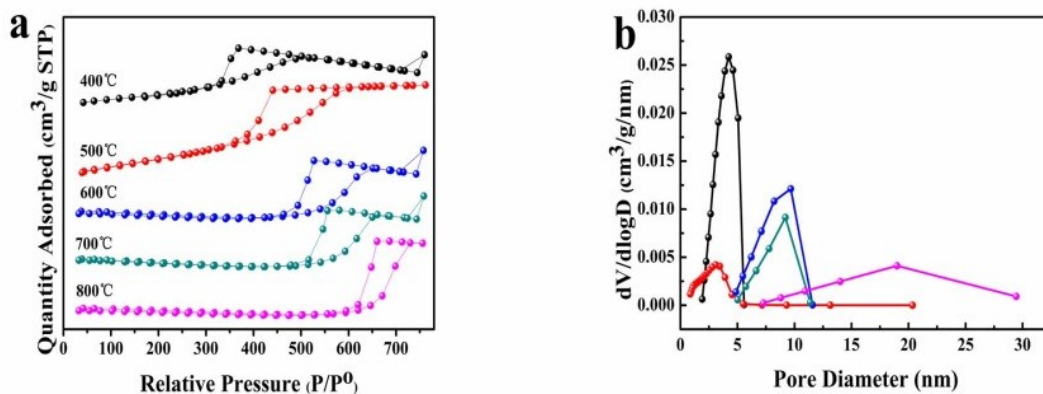


Fig. S10. (a) Nitrogen adsorption/desorption isotherms of 0.2FS catalyst annealed at different temperature. (b) corresponding distributions of pore diameters obtained from the desorption branch using the BJH method.

Table S2: Catalytic sample L Acid and B Acid content and catalytic performance at different calcination temperatures

| Catalyst | L (mmol/g) | B (mmol/g) | Glucose Conversion (%) | MLA Yield (%) |
|----------|------------|------------|------------------------|---------------|
| 400°C | 373.14 | 1.92 | 99 | 25 |
| 500°C | 177.36 | 6.20 | 99 | 35 |
| 600°C | 432.58 | 1.53 | 99 | 27 |
| 700°C | 353.85 | 1.05 | 99 | 27 |
| 800°C | 472.76 | 2.37 | 99 | 26 |

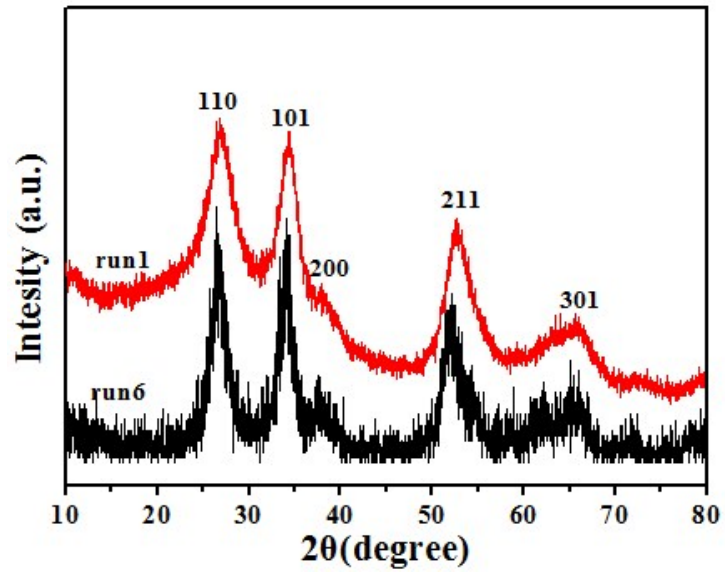


Fig.S11: X-ray diffraction patterns of of 0.2FS after cyclic test

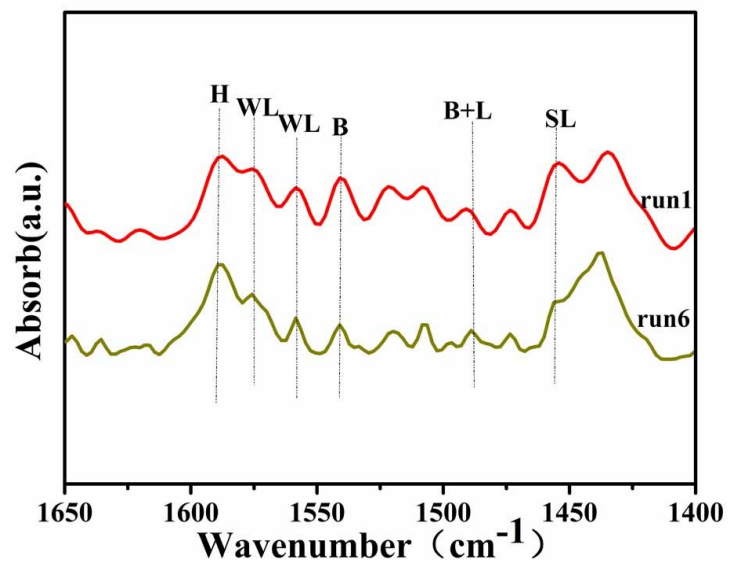


Fig.S12: The Py-IR images of 0.2FS after cyclic test