

Figure S1: XRD patterns of Ce20W10Ti100O*z*-Ce3+(a), Ce20W10Ti100O*z*-Ce3+:Ce4+=17.5:2.5(b) and Ce20W10Ti100O*z*-Ce3+:Ce4+=17.5:2.5+H2O2(c), respectively. (color online)



Figure S2: NH3-TPD of Ce20W10Ti100O*z*-Ce3+, Ce20W10Ti100O*z*-Ce3+:Ce4+=17.5:2.5 and Ce20W10Ti100O*z*-Ce3+:Ce4+=17.5:2.5+H2O2, respectively. (color online)

TABLE SⅢ. Performance of various catalysts for NH3-SCR reaction

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Samples | *T*max | Temperature window | GHSV/WHSV | Reference |
| Above 90% NO*x* conversion |
| Ce20W10Ti100O*z*-Ce3+:Ce4+=17.5:2.5+H2O2 | 350 oC |  325~425 oC  | 1,200,000 ml/(g·h) | In this paper |
| MC1.5MW/TSa | 300 oC | - | 15,000 /h | 4 |
| Ce-MnTiO*x*/ATPb | 275 oC | 200~350 oC | 40,000 /h | 7 |
| CePMoTiO*x*c | 350 oC | 275~425 oC | 100,000 /h | 10 |
| TmCA-0.10(Tm:Ce=0.10:1)d | 360 oC | 305~455 oC | 5,000 /h | 16 |
| Ti-Ce-O*x*-500e | 400 oC | 345~500 oC | 100,000 /h | 22 |
| WO3(1)-CeO2f | 250 oC | 225~350 oC | 30,000 /h | 23 |
| CeWTi-Hg | 450 oC | - | 150,000 /h | 25 |
| CeO2-WO3/TiO2-SiO2h  | 350 oC | 300~450 oC | 120,000 ml/(g·h) | 26 |
|  Ce0.2W0.2Tii | 300 oC | 250~450 oC |  120,000 ml/(g·h) | 32 |
|  CeWTij  | 300 oC | 210~450 oC | 150,000 /h | 33 |
| Ce0.2W0.2TiO*x*k | 350 oC | 260~450 oC | 500,000 /h | 34 |
| Ce20W10Til | 400 oC | - | 200,000 /h | 35 |
| Ce0.1W0.1Ti0.8m | 250 oC | 210~450 oC | 60,000 /h | 42 |
|  Fe (0.2)-W (0.05)-Tin | 360 oC | 280~420 oC | 25,000 /h | 44 |
|  Ce/TiO2o | 300 oC | 275~400 oC | 108,000 /h | 49 |
| CeO2/ZrPp | 275 oC | 250~425 oC | 60,000 /h | 51 |
| CeTiR-500q | 270 oC | 220~320 oC | 40,000 /h | 54 |
| 20CeO2/Ti-Zr-Sr | 250 oC | 225~450 oC | 60,000 /h | 55 |
| CeSbZrO*x*s | 225 oC | 200~425 oC | 50,000 /h | 56 |

  *T*max: Temperature of the highest NO*x* conversion.

a: Reaction condition: 600 ppm NH3, 600 ppm NO, 6 vol.% O2 and N2 balance gas.

 b: Reaction condition: 1000 ppm NH3, 1000 ppm NO, 5 vol.% O2 and N2 balance gas.

c: Reaction condition: 500 ppm NH3, 500 ppm NO, 5 vol.% O2 and N2 balance gas.

d: Reaction condition: 600 ppm NH3, 600 ppm NO, 6 vol.% O2 and N2 balance gas.

e: Reaction condition: 600 ppm NH3, 600 ppm NO, 6 vol.% O2 and N2 balance gas.

f: Reaction condition: 500 ppm NH3, 500 ppm NO, 5 vol.% O2 and N2 balance gas.

g: Reaction condition: 1000 ppm NH3, 1000 ppm NO, 0-10 vol.% O2 and N2 balance gas.

h: Reaction condition: 500 ppm NH3, 500 ppm NO, 3 vol.% O2 and N2 balance gas.

i: Reaction condition: 500 ppm NH3, 500 ppm NO, 5 vol.% O2 and N2 balance gas.

j: Reaction condition:1000 ppm NH3,1000 ppm NO*x*(NO and NO2),0-10 vol.% O2 and N2 balance gas.

k: Reaction condition: 500 ppm NH3, 500 ppm NO, 5 vol.% O2 and N2 balance gas.

l: Reaction condition: 1000 ppm NH3, 1000 ppm NO, 3 vol.% O2 and N2 balance gas.

m: Reaction condition: 500 ppm NH3, 500 ppm NO, 5 vol.% O2 and N2 balance gas.

n: Reaction condition: 500 ppm NH3, 500 ppm NO, 5 vol. % O2 and N2 balance gas.

o: Reaction condition: 600 ppm NH3, 600 ppm NO, 5 vol.% O2 and Air balance gas.

p:Reaction condition: 600 ppm NH3, 600 ppm NO, 5 vol.% O2 and N2 balance gas.

q: Reaction condition: 600 ppm NH3, 600 ppm NO, 3 vol.% O2 and N2 balance gas.

r: Reaction condition: 600 ppm NH3, 600 ppm NO, 5 vol.% O2 and N2 balance gas.

s: Reaction condition: 500 ppm NH3, 500 ppm NO, 5 vol.% O2 and N2 balance gas.