

Supporting information

Oxygen Vacancy-Rich $\text{In}_2\text{O}_3\text{-ZrO}_2$ Catalysts Synthesized via DBD Plasma for Enhanced CO_2 -to-CO conversion

Sai Li^{a*}, Yuhang Wang^a, Kui Zhang^b, Haiyan Zhu^c, Shaobo Jia^c, Dongyuan Yang^a, Peng Ren^d, Zekai Ma^a, Shuoshuo Wang^a, Haixia Wu^a, Yameng Ma^a, Qi Chen^a, Jiahao Zhouhuang^a, Qiuliang Yu^g, Lihui Zeng^h, Rui Tan^e, Zhiming Feng^{f*}, Qing Feng^{d*}

^a School of Chemistry and Chemical Engineering, Xi'an University of Science and Technology, Xi'an, 710054, China

^b School of Engineering, Newcastle University, Newcastle upon Tyne NE1 7RU, United Kingdom

^c Shaanxi Key Laboratory for Theoretical Physics Frontiers, Institute of Modern Physics, Northwest University, Xi'an, Shaanxi 710069, China.

^d Xi'an Tai Jin Xin Neng Technology Co., LTD, Xi'an, 710201, China

^e Department of Chemical Engineering, Swansea University, Swansea, SA1 8EN, UK

^f Department of Chemical Engineering, University of Manchester, Manchester, M13 9PL, UK

^g Shaanxi Anchuang Electronic Technology Co., LTD, Xi'an, 710201, China.

^h Kaili Catalyst New Materials CO., LTD · Xi'an, 710201, China

*Corresponding author: saili@xust.edu.cn (S. Li); zhiming.feng@manchester.ac.uk (Z. Feng); fengqing0715@126.com(Q.Feng)

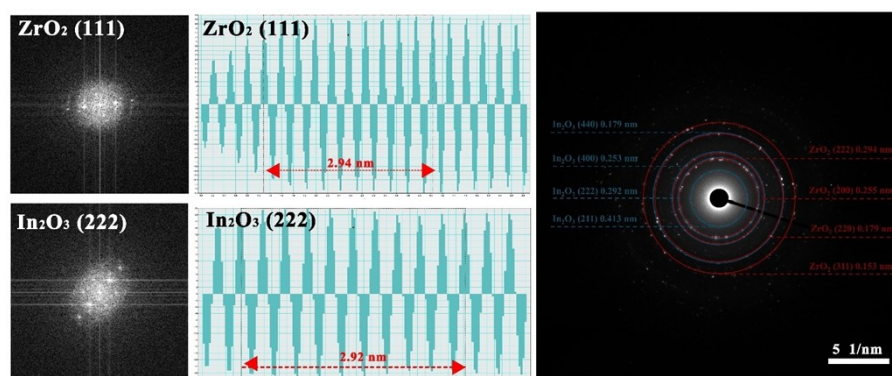


Fig. S1. FFT and IFFT analysis images as well as SAED analysis image of the composite catalyst

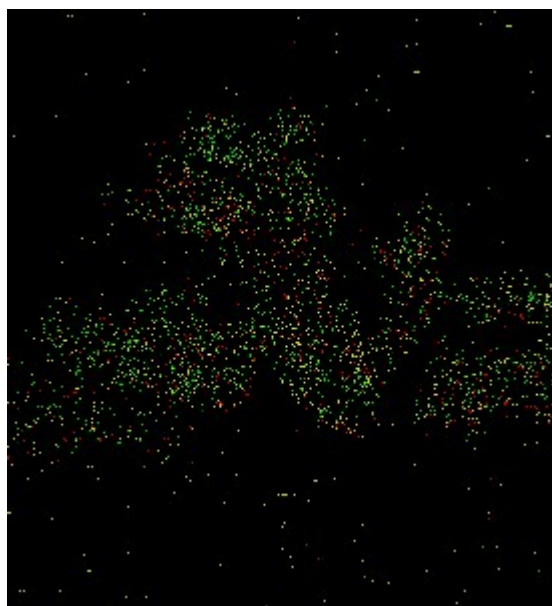


Fig. S2. EDS elemental distribution image of the In-Zr(1:1) catalyst

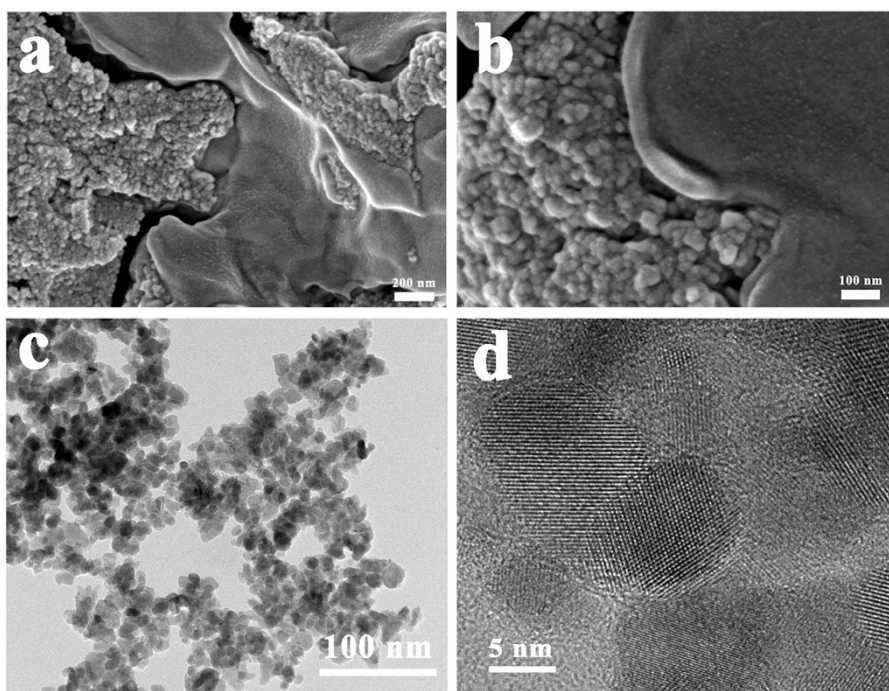


Fig. S3. a, b are the SEM images of the In-Zr catalyst after DBD treatment; (c) The TEM image; (d) The HRTEM image

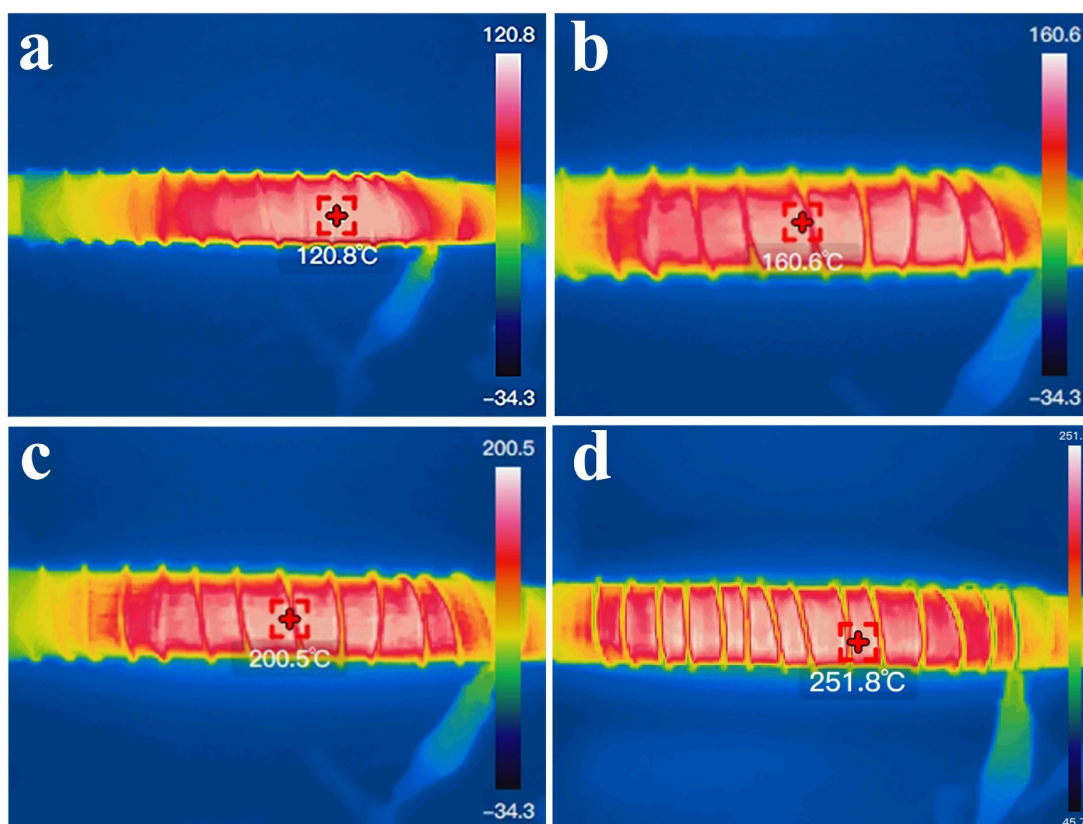


Figure S4. Diagram of SIE and temperature correspondence of (a) SIE=104 kJ/L (b) SIE=148 kJ/L (c) SIE=193 kJ/L (d) SIE=237 kJ/L

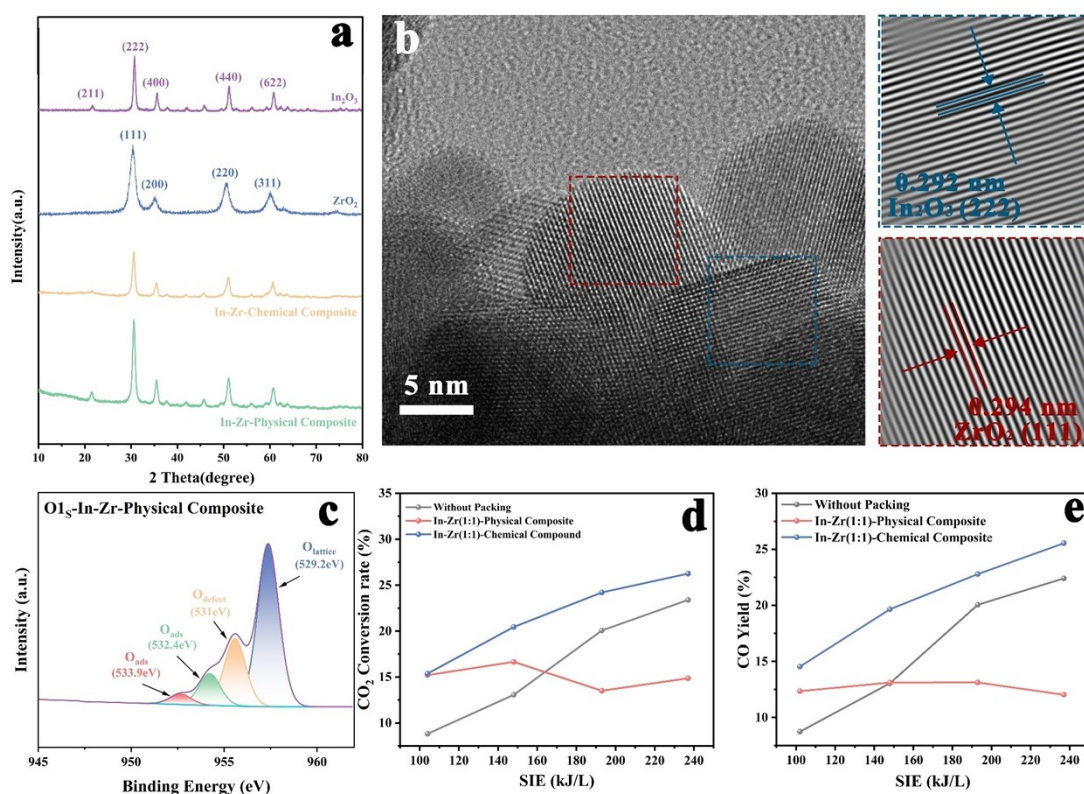


Fig. S5. (a) The XRD pattern of different catalysts; (b) The HRTEM analysis of the physically composite catalyst; (c) The O 1s XPS spectrum analysis of the physically composite catalyst; (d) The CO_2 conversion rate test graph of different catalysts under different SIE conditions; (e) The CO yield test graph of different catalysts under different SIE conditions

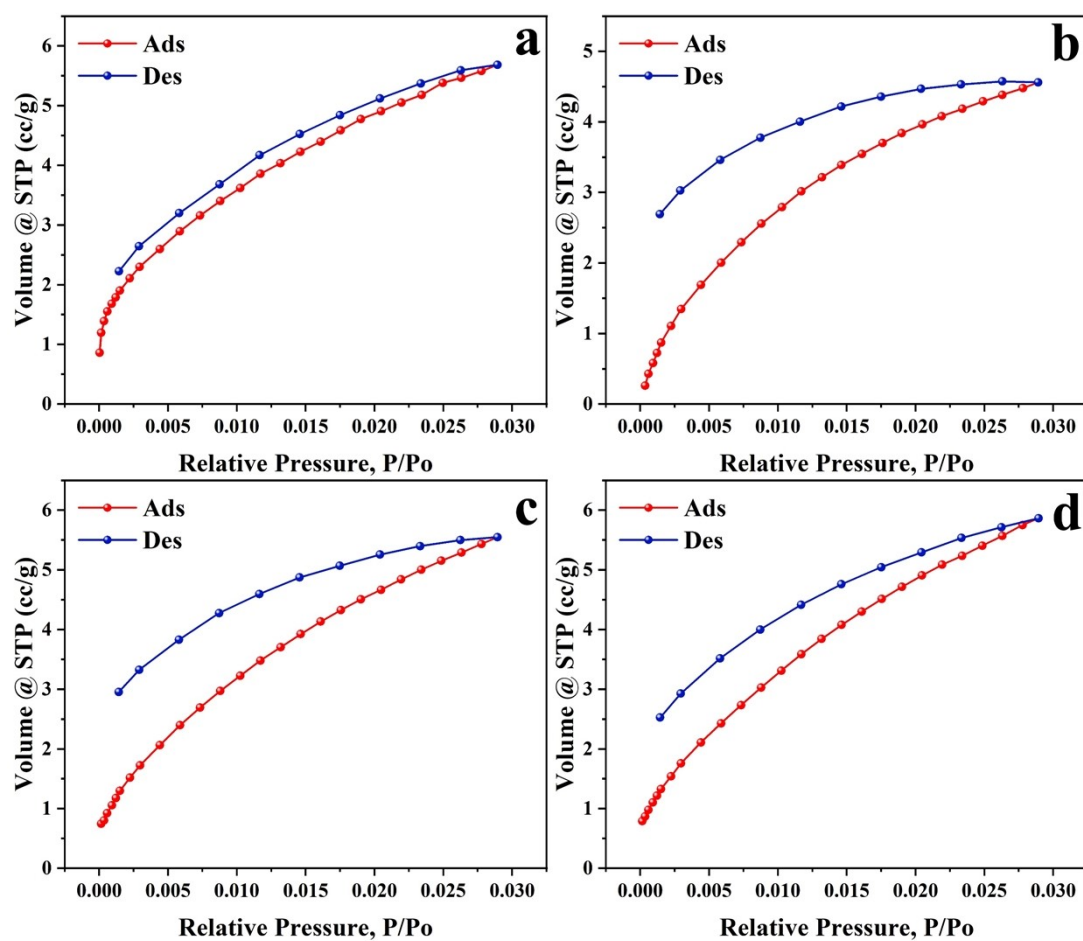


Figure S6. CO₂ isothermal adsorption-desorption curves of (a)In₂O₃ (b)ZrO₂ (c)In-Zr(1;1) (d) In-Zr(1;1)-DBD

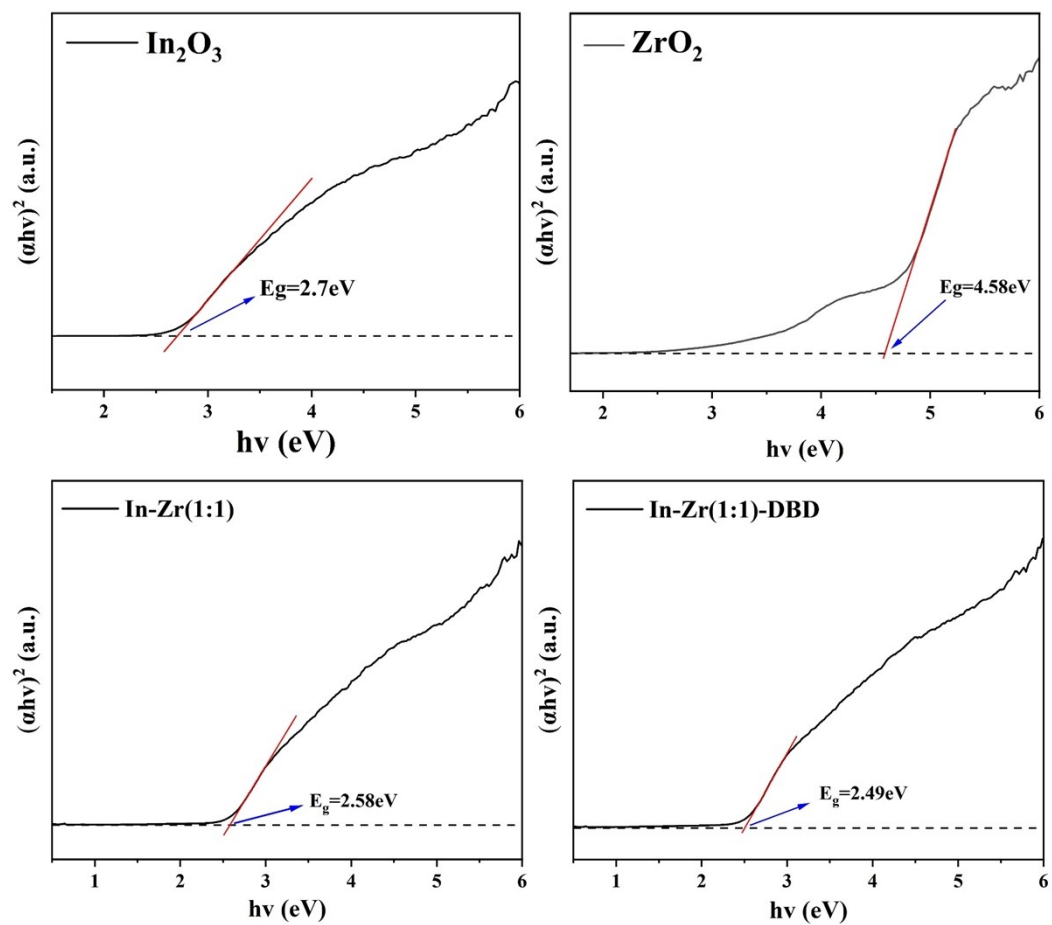


Figure S7. Estimated bandgap widths for different catalysts