Supporting Information

Naphtha catalytic cracking to olefins over zirconia-titania catalyst

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3. Results and Discussion

Table 1S. The textural properties of synthesized Zr-Ti oxide catalyst after reaction

Catalyst	Surface area, $m^2\ g^{-1}$	Pore volume $cm^3 g^{-1}$
10% Zr-Ti oxide	15.7	0.15
10% Zr-Ti oxide after reaction	12.9	0.05
50% Zr-Ti oxide	48.7	0.33
50% Zr-Ti oxide after reaction	26.0	0.24

Table 2S. The Lewis and Brønsted acid sites concentrations from the adsorption of pyridine-FTIR of Zr-Ti oxide catalyst

Catalyst	Temperature (^oC)	*C_L ($mmol g^{-1}$)	**C_B ($mmol g^{-1}$)	Total acidity ($mmol g^{-1}$)	L/B**
TiO_2	150	0.019	0.004	0.023	4.9
10% Zr-Ti oxide	150	0.060	0.009	0.069	6.8
50% Zr-Ti oxide	150	0.137	0.019	0.156	7.2

*C_L: concentration of Lewis acid sites, **C_B: concentration of Brønsted acid sites, ***L/B: Lewis/ Brønsted acid ratio

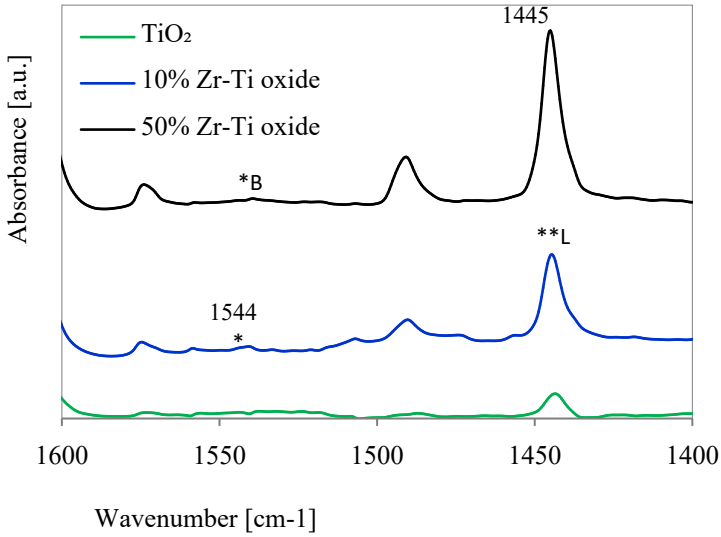

Figure 1S. FTIR-pyridine spectrum of Zr-Ti oxide catalyst (*Brønsted acid sits **Lewis acid sites)

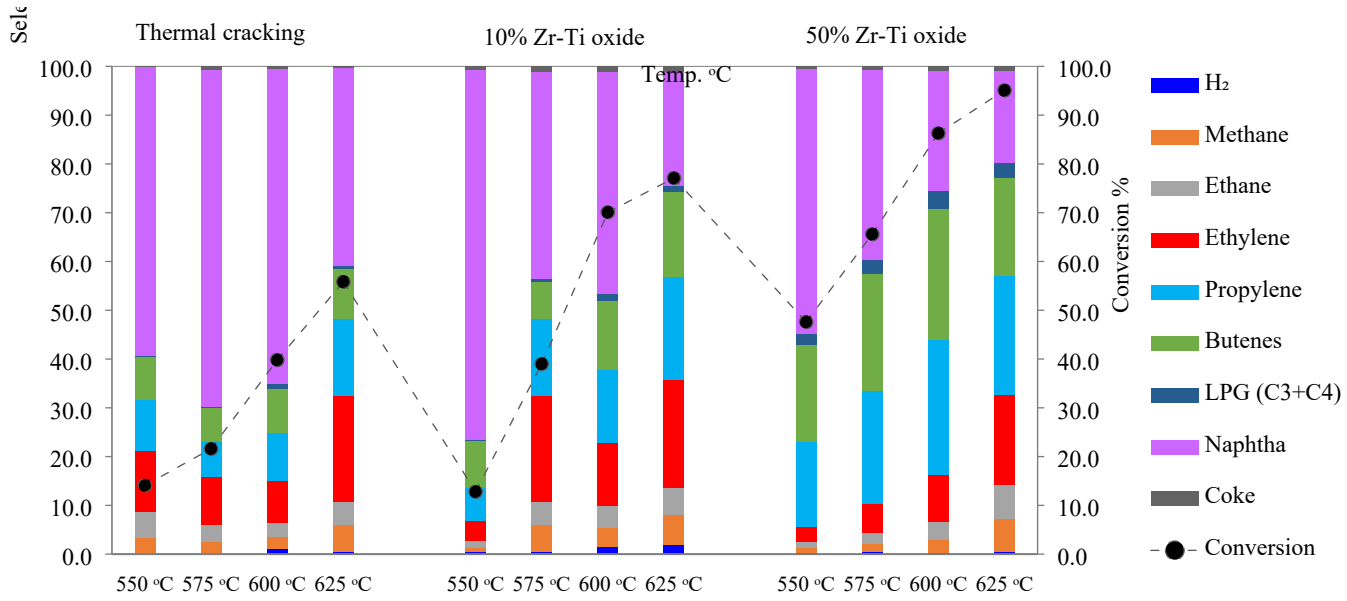

Figure 2S. Conversion and selectivity of light olefin and other products from dodecane conversion using Zr-Ti oxide catalysts compared with thermal cracking vs. reactor temperature (without steam), LHSV 0.5 h^{-1}

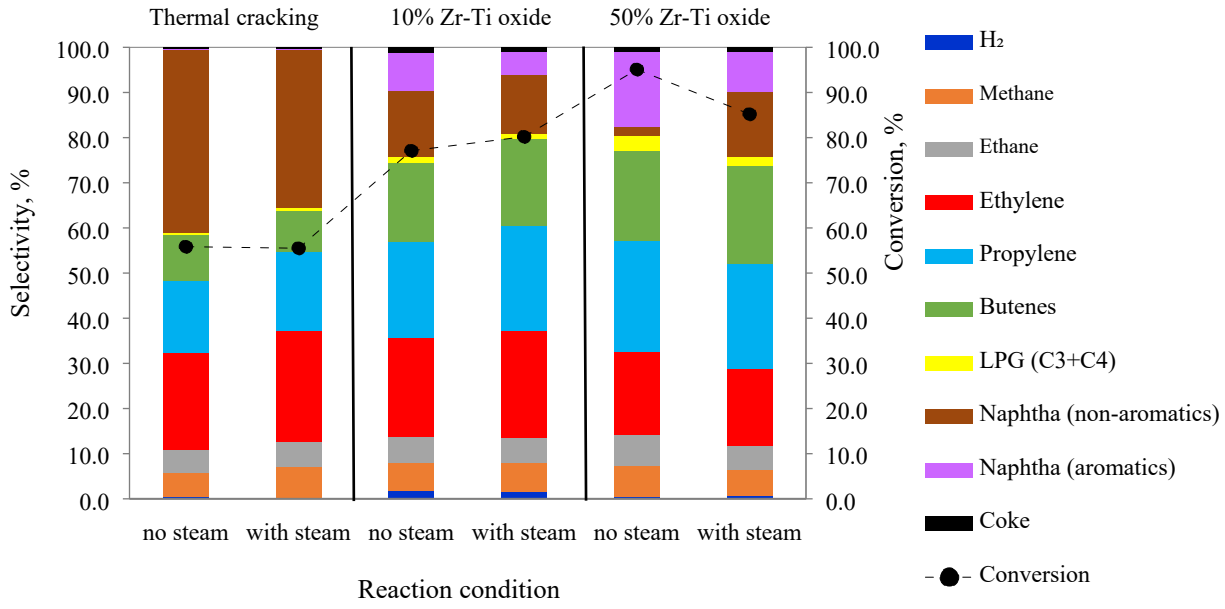

Figure 3S. Steam vs. no steam catalytic cracking of dodecane conversion and selectivity of light olefin and other product using Zr-Ti oxide catalysts compared with thermal cracking vs. reactor temperature (cracking temperature 625 ^{o}C, LHSV 0.5 h^{-1})

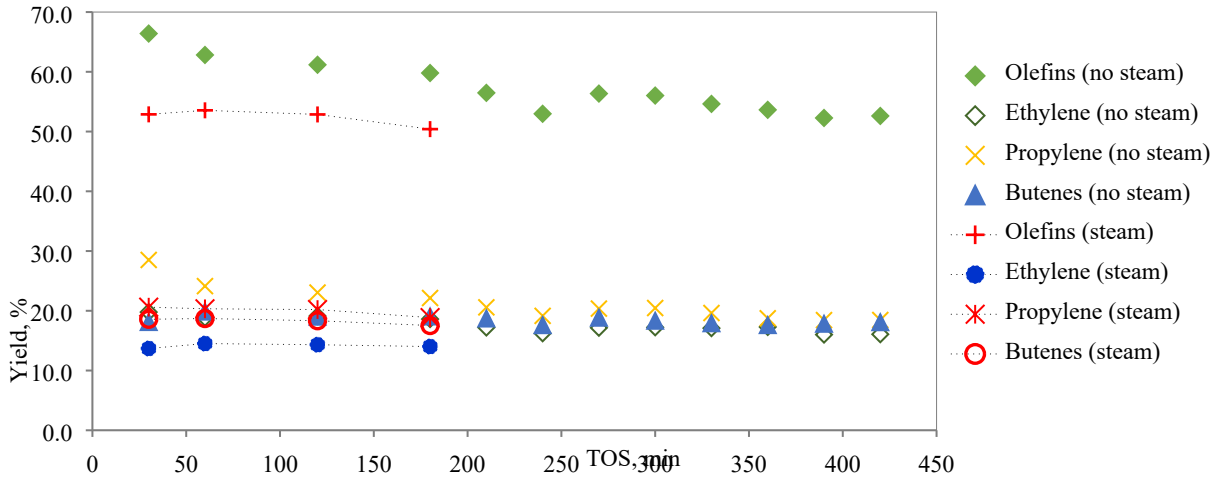

Figure 4S. Steam vs. no steam of time-on-stream catalytic cracking: yield of olefin, ethylene, propylene and butenes of 50% Zr-Ti oxide (catalytic cracking temperature 625 ^{o}C, LHSV 0.5 h^{-1})

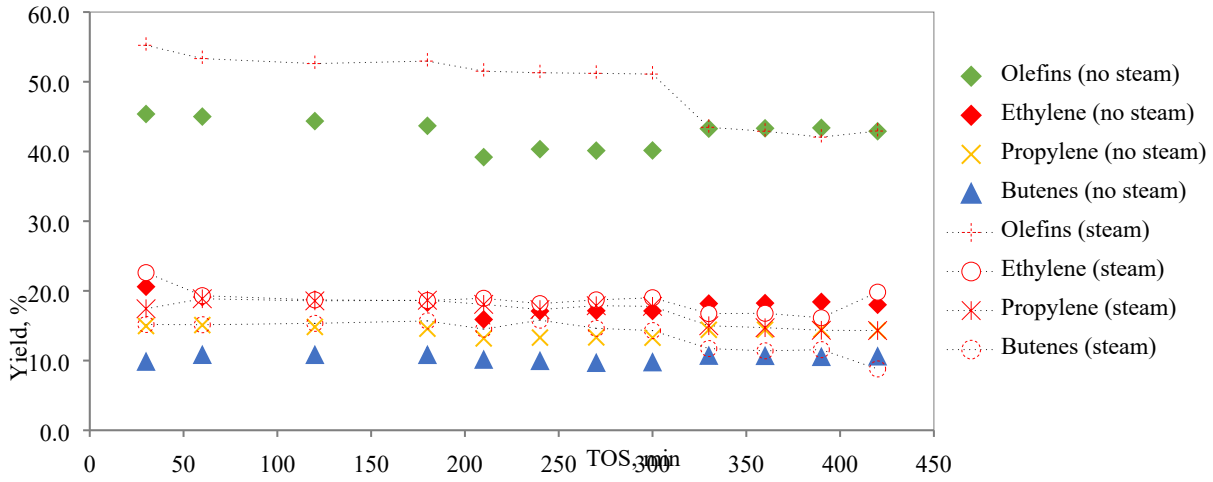

Figure 5S. Steam vs. no steam of time-on-stream catalytic cracking: yield of olefin, ethylene, propylene and butenes of 10% Zr-Ti oxide (catalytic cracking temperature 625 ^{o}C, LHSV 0.5 h^{-1})

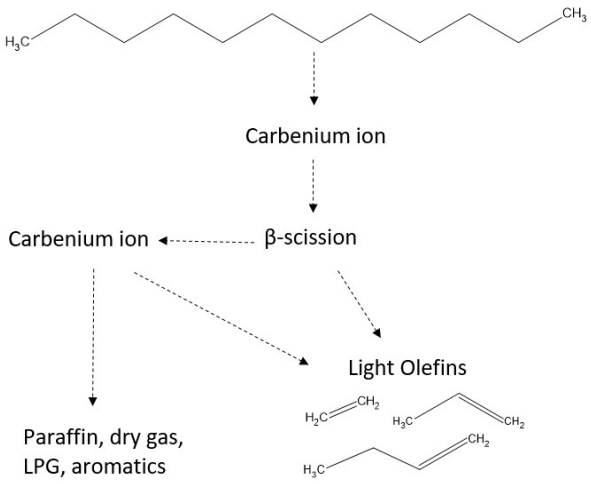

Figure 6S. Schematic diagram of dodecane cracking via Zr-Ti oxide catalyst