Supplementary Information For

Identification of coke species on Fe/USY catalysts used for recycling polyethylene into fuels

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Table S1. The surface area and porosity of the USY zeolites with varied Si/Al ratios

Catalysts	S_{BET} (m^2/g)	S_{Micro} (m^2/g)	S_{Meso} (m^2/g)	V_{total} (cm^3/g)	V_{micro} (cm^3/g)	V_{meso} (cm^3/g)
USY(20)	648.3	539.5	108.8	0.48	0.278	0.202
USY(60)	653.7	531.2	122.5	0.491	0.275	0.216
USY(80)	660.3	528.3	132	0.487	0.272	0.215
USY(120)	688.9	548.3	140.6	0.511	0.288	0.223

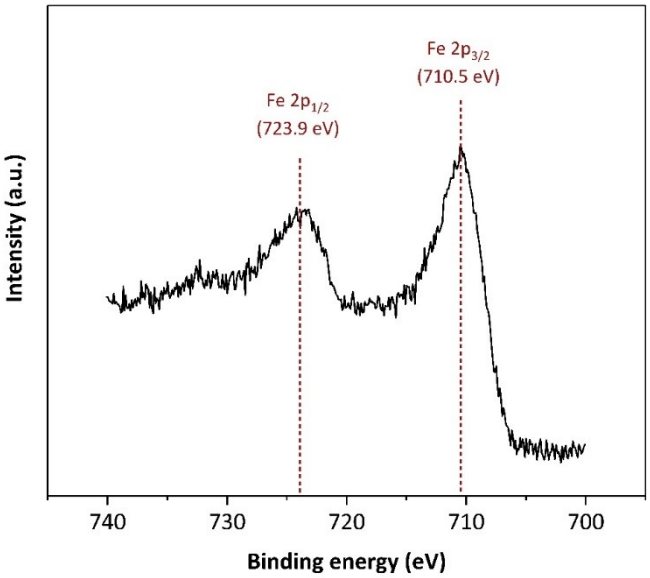

Fig. S1. The XPS spectrum of Fe 2p on the 10%Fe/USY catalyst.

The XPS spectrum of the Fe/USY catalyst shows two distinct Fe 2p peaks at 710.5 and 723.9 eV, which can be typically attributed to the Fe $2p_{3/2}$ and Fe $2p_{1/2}$ peak of the Fe_2O_3, respectively [S1], confirming that the iron species loaded on USY is Fe_2O_3.

[S1] Tan BJ, Klabunde KJ, Sherwood PM. X-ray photoelectron spectroscopy studies of solvated metal atom dispersed catalysts. Monometallic iron and bimetallic iron-cobalt particles on alumina. Chem Mater 1990;2:186-91.

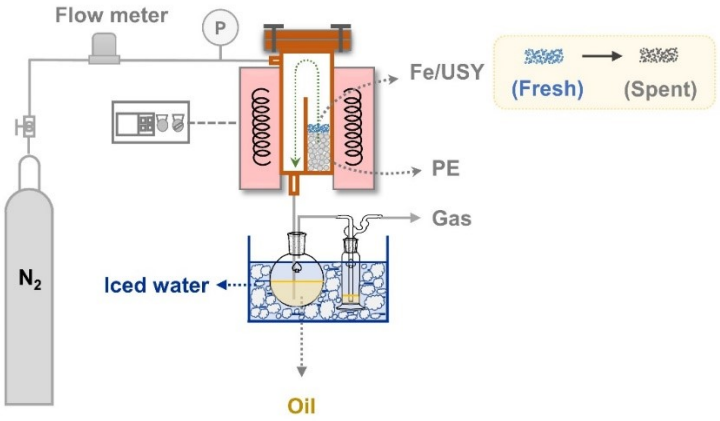

Fig. S2. Schematic diagram of the catalytic pyrolysis system.

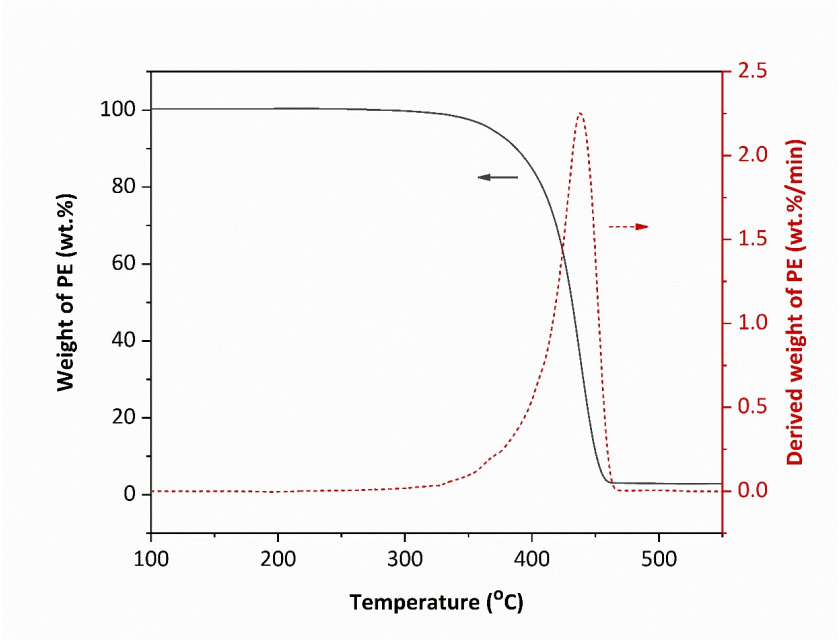

Fig. S3. TG profile of PE decomposition from 100 to 550°C under N_2 atmosphere.