

Supporting information

1. Carbon balance data:

1.1 Self-reforming of PODE₁₋₂ stream (Figure 3)

Table S-1 Carbon balance data in self-reforming of PODE₁₋₂ stream
(Reaction temperature: 80 °C, NKC-9 catalyst loading: 5 wt%)

Species	Reactor In		Reactor Out	
	Mass (%)	Carbon (wt%)	Mass (%)	Carbon
PODE ₁ (DMM)	13.85	6.56	45.51	21.56
PODE ₂	72.85	32.99	22.29	10.10
PODE ₃	2.29	1.01	6.27	2.76
PODE ₄	0.00	0.00	3.06	1.33
PODE ₅	0.00	0.00	1.12	0.48
PODE ₆	0.00	0.00	0.37	0.16
PODE ₇	0.00	0.00	0.00	0.00
PODE ₈	0.00	0.00	0.00	0.00
Total FA	10.88	4.35	21.14	8.46
Sum	99.9	44.92	99.8	44.84

1.2 Self-reforming of PODE_{n>4} stream (Figure 4)

Table S-2 Carbon balance data in self-reforming of PODE_{n>4} stream
(Reaction temperature: 80 °C, NKC-9 catalyst loading: 5 wt%)

Species	Reactor In		Reactor Out	
	Mass (%)	Carbon (wt%)	Mass (%)	Carbon
PODE ₁ (DMM)	0.00	0.00	20.60	9.76
PODE ₂	0.00	0.00	11.50	5.21
PODE ₃	0.00	0.00	6.44	2.84
PODE ₄	0.00	0.00	3.32	1.44
PODE ₅	74.08	31.75	2.96	1.27
PODE ₆	26.12	11.10	1.66	0.71
PODE ₇	0.00	0.00	0.67	0.28

PODE ₈	0.00	0.00	0.30	0.13
Total FA	0.00	0.00	52.95	21.18
Sum	100.20	42.84	100.40	42.81

1.3 Reforming of PODE₁₋₂ stream by reacting with DMM (Figure 5)

Table S-3 Carbon balance data in reforming of PODE₁₋₂ stream by reacting with DMM
($M_{eq}=2:1$, Reaction temperature: 80 °C, NKC-9 catalyst loading: 5 wt%)

Species	Reactor In		Reactor Out	
	Mass (%)	Carbon (wt%)	Mass (%)	Carbon
PODE ₁ (DMM)	56.38	26.71	57.16	27.08
PODE ₂	36.80	16.67	26.92	12.19
PODE ₃	1.16	0.51	8.61	3.80
PODE ₄	0.00	0.00	3.76	1.63
PODE ₅	0.00	0.00	1.41	0.60
PODE ₆	0.00	0.00	0.43	0.18
PODE ₇	0.00	0.00	0.00	0.00
PODE ₈	0.00	0.00	0.00	0.00
Total FA	5.56	2.22	3.56	0.76
Sum	99.90	46.11	101.85	46.25

1.4 Reforming of PODE₁₋₂ stream by reacting with DMM (Figure 6)

Table S-4 Carbon balance data in reforming of PODE_{n>4} stream by reacting with DMM
($M_{eq}=2:1$, Reaction temperature: 80 °C, NKC-9 catalyst loading: 5 wt%)

Species	Reactor In		Reactor Out	
	Mass (%)	Carbon (wt%)	Mass (%)	Carbon
PODE ₁ (DMM)	73.72	34.92	58.16	27.55
PODE ₂	0.00	0.00	22.79	10.32
PODE ₃	0.00	0.00	10.25	4.52
PODE ₄	0.00	0.00	4.20	1.82
PODE ₅	19.50	8.36	1.58	0.68
PODE ₆	6.85	2.91	0.66	0.28

PODE ₇	0.00	0.00	0.27	0.11
PODE ₈	0.00	0.00	0.10	0.04
Total FA	0.00	0.00	3.64	0.99
Sum	100.07	46.19	101.65	46.32