Supplementary Information

Table S1. VFA standard solution concentrations (mmol/L)

	AA	PA	IBA	BA	IVA	VA	Crotonic acid
1	2.405	0.794	0.318	0.318	0.309	0.309	1
2	4.811	1.587	0.636	0.636	0.617	0.617	1
3	7.216	2.381	0.954	0.954	0.926	0.926	1
4	9.622	3.175	1.272	1.272	1.234	1.234	1
5	12.027	3.968	1.59	1.59	1.543	1.543	1

Table S2. Inter-subject effects of different initial oxygen flux and BES addition on physicochemical properties

Index	Significance			Partial Eta	
	O_2	BES	O_2•BES	η^2（O_2）	η^2（BES）
pH (14 d)	$p < 0.05$	$p < 0.05$	$p < 0.05$	0.98	0.65
EC (14 d) (mS/cm)	$p < 0.05$	$p < 0.05$	$p < 0.05$	0.90	0.30
SCOD (14 d) (g/L)	$p < 0.05$	$p > 0.05$	$p < 0.05$	0.97	0.26
H_2 (14 d) (%)	$p < 0.05$	$p < 0.05$	$p < 0.05$	1.00	0.998
N_2 (14 d) (%)	$p < 0.05$	$p < 0.05$	$p < 0.05$	1.00	0.97
CH_4 (14 d) (%)	$p < 0.05$	$p < 0.05$	$p < 0.05$	0.97	0.59
CO_2 (14d) (%)	$p < 0.05$	$p > 0.05$	$p < 0.05$	1.00	0.97
VFA (14d) (mg/L)	$p < 0.05$	$p > 0.05$	$p < 0.05$	0.81	0.52
AA(14 d) (mg/L)	$p < 0.05$	$p < 0.05$	$p < 0.05$	0.55	0.78
PA (14 d) (mg/L)	$p < 0.05$	$p > 0.05$	$p < 0.05$	0.98	0.19
IBA (14 d) (mg/L)	$p < 0.05$	$p > 0.05$	$p < 0.05$	0.89	0.27
BA (14 d) (mg/L)	$p < 0.05$	$p < 0.05$	$p < 0.05$	0.94	0.84
IVA (14 d) (mg/L)	$p < 0.05$	$p > 0.05$	$p < 0.05$	0.92	0.21
VA (14 d) (mg/L)	$p < 0.05$	$p > 0.05$	$p < 0.05$	0.88	0.05

Note: In the same index, the lager the square of partial Eta, the greater the contribution of different initial oxygen permeability or different BES additions to the change of the measured value of this index.

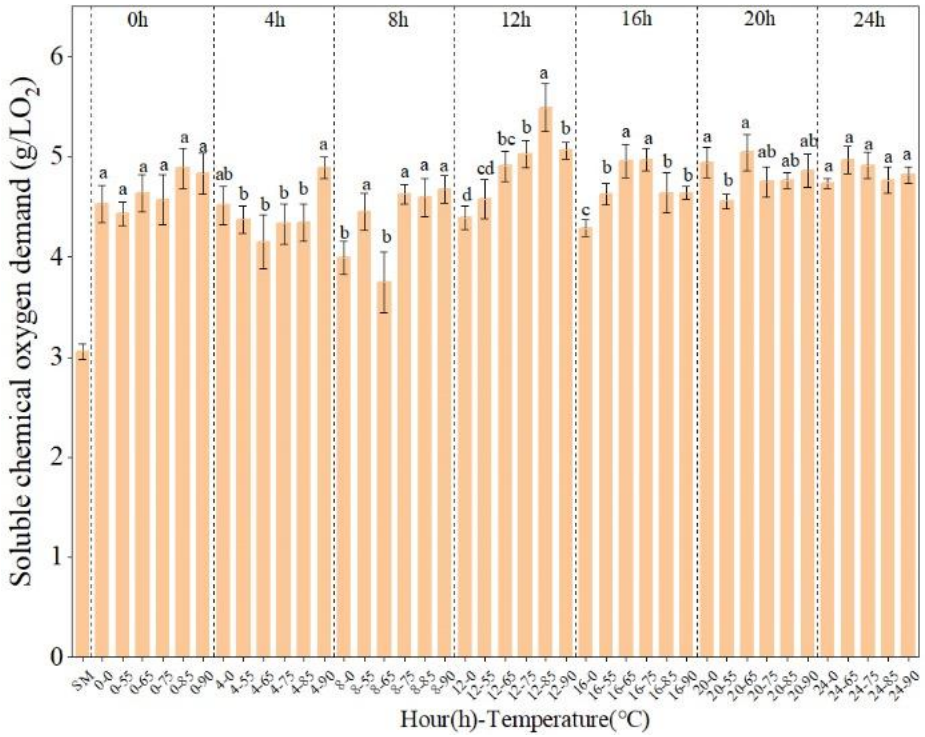

Figure S1. Changes in SCOD in compost-assisted thermal pretreatment.

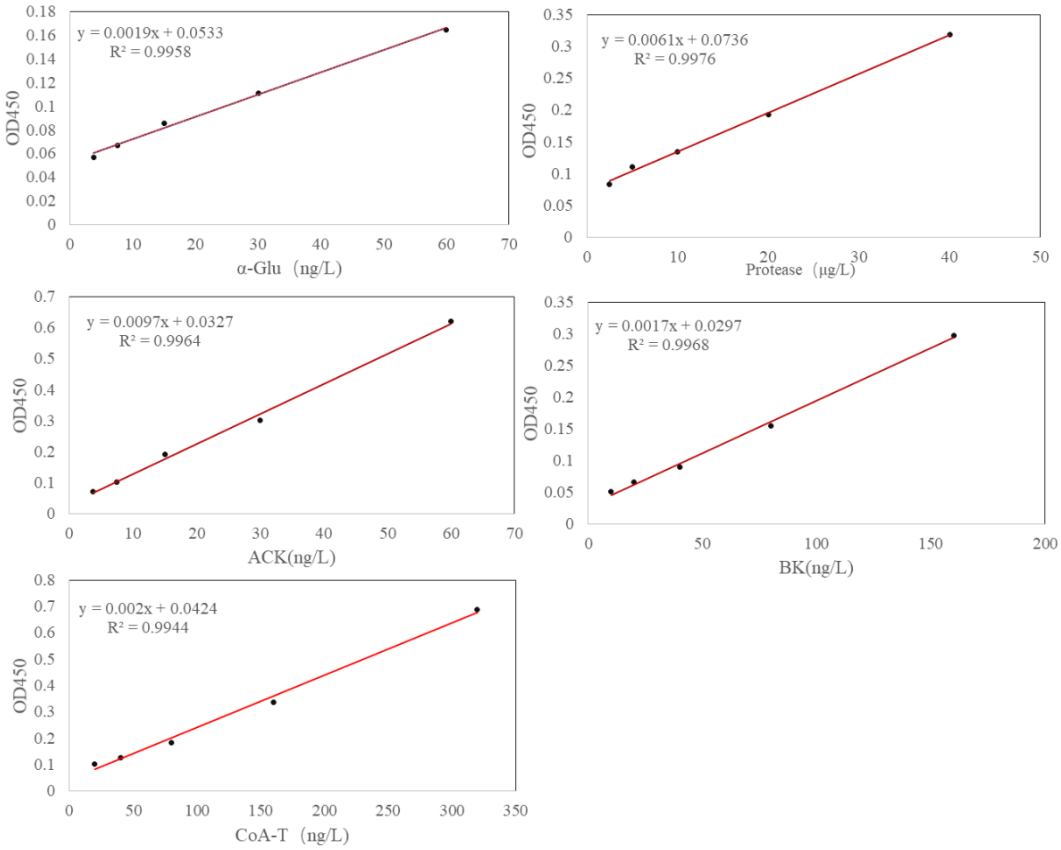

Figure S2. Standard curve for α-Glu; Protease; ACK; BK and CoA-T.

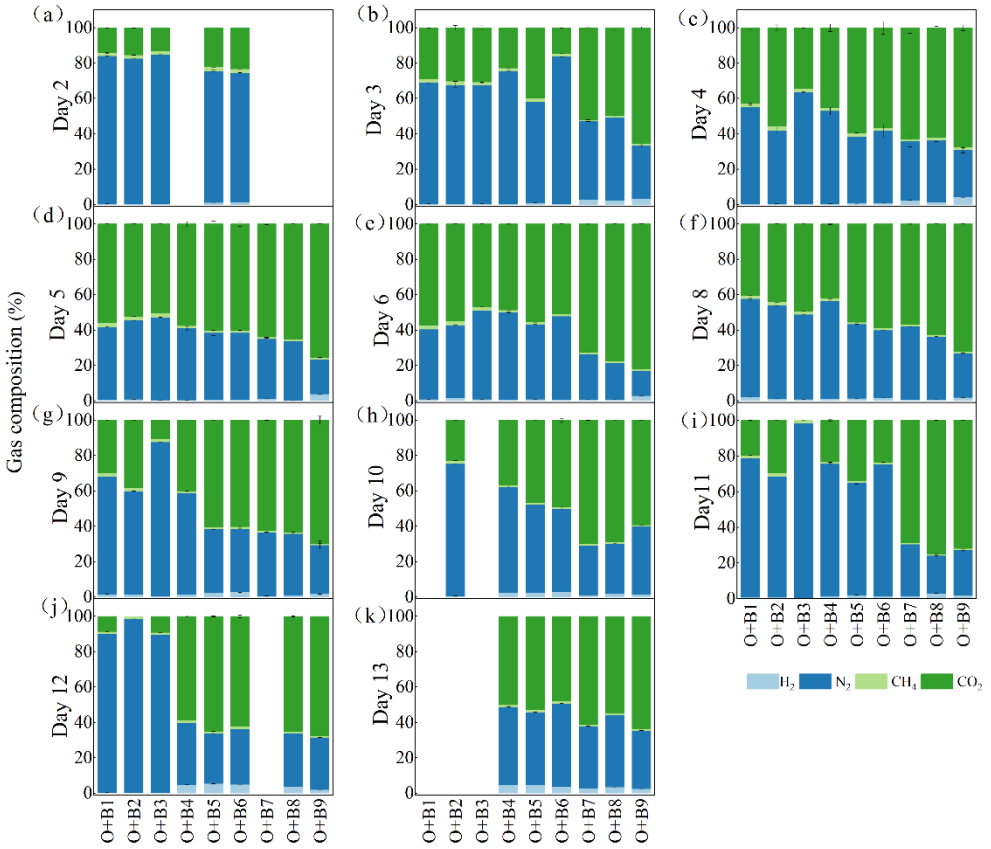

Figure S3. Daily gas composition: (a-e) Days 2-6, (f-k) Days 8-13. Treatment codes: O+B1 to O+B9 (defined in Table 1).