Supporting Information

Evaluation on Thermal Behavior, Synergistic Catalysis, and Pollutant Emissions during the Co-combustion of Sewage Sludge and Coal Gasification Fine Slag Residual Carbon

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The list of supplementary tables and figures:

Table S1. Kinetic mechanism functions.

Kinetic mechanism functions	$g(\alpha)$
O1, Chemical reaction, First-order	$-\ln(1-\alpha)$
O2, Chemical reaction, Second-order	$(1-\alpha)^{-1}$
O3, Chemical reaction, Third-order	$(1-\alpha)^{-2}$
D1, One-dimensional diffusion	α^2
D2, Two-dimensional diffusion	$(1-\alpha)\ln(1-\alpha)+\alpha$
D3, Three-dimensional diffusion, Spherical model	$[1-(1-\alpha)^{1/3}]^2$
D4, Three-dimensional diffusion, Outside of a spherical model	$1-2\alpha/3-(1-\alpha)^{2/3}$

Table S2. Kinetic parameters of various samples at different combustion stage.

Samples	Combustion stage	Kinetic mechanism functions	Coats-Redfern method	
			Kinetic equation	R^2
SS	Stage 1	O1	**Y=-2286.5X-9.3**	**0.9812**
		O2	Y=3324.6X-6.2	0.8986
		O3	Y=-7952.7X+2.6	0.9211
		D1	Y=-2555.1X-10.1	0.7503
		D2	Y=-3312.5X-9.2	0.8404
		D3	Y=-4488.7X-8.4	0.9282
		D4	Y=-3688.3X-10.0	0.8761
RC	Stage 2	O1	**Y=-12711.1X+18.4**	**0.9789**
		O2	Y=-50289.5X+48.2	0.8949
		O3	Y=-102686.4X+111.9	0.8980

		D1	Y=-22390.0X+12.1	0.7160
		D2	Y=-28645.5X+19.2	0.7657
		D3	Y=-40197.6X+31.9	0.8371
		D4	Y=-32203.3X+22.1	0.7930
		O1	**Y=-4051.0X+20.1**	**0.9714**
		O2	Y=-4236.7X+23.2	0.9512
		O3	Y=-4409.15X+27.5	0.9043
	Stage 1	D1	Y=-3956.6X-11.0	0.9286
		D2	Y=-4050.3X-11.4	0.9318
		D3	Y=-4641.8X-12.7	0.9350
		D4	Y=-4082.5X-12.9	0.9329
20SS80RC		O1	**Y=-6644.2X+18.0**	**0.9844**
		O2	Y=-7058.0X+21.3	0.8085
		O3	Y=-5768.5X+15.2	0.8174
	Stage 2	D1	Y=-6479.1X+14.4	0.8871
		D2	Y=-7417.0X+16.5	0.9013
		D3	Y=-8751.1X+21.7	0.8989
		D4	Y=-8432.2X+19.9	0.9233
		O1	**Y=-3633.6X-11.1**	**0.9691**
		O2	Y=-3815.0X-13.2	0.9235
		O3	Y=-4947.2X-20.5	0.9107
	Stage 1	D1	Y=-4575.0X-8.7	0.9244
40SS60RC		D2	Y=-4779.0X-9.0	0.9310
		D3	Y=-4995.2X-10.1	0.9375
		D4	Y=-4851.1X-10.4	0.9333
	Stage 2	O1	**Y=-6181.1X+3.3**	**0.9573**

		O2	Y=-6658.3X+5.2	0.9102
		O3	Y=-6947.2X+7.5	0.8876
		D1	Y=-5145.0X+24.4	0.9213
		D2	Y=-6107.0X+22.5	0.9009
		D3	Y=-6751.1X+21.7	0.9227
		D4	Y=-6832.2X+20.9	0.9235
		O1	**Y=-4308.4X-10.4**	**0.9828**
		O2	Y=-5315.0X-12.6	0.9012
		O3	Y=-5947.2X-13.4	0.9680
	Stage 1	D1	Y=-4437.2X-8.14	0.9093
		D2	Y=-4757.8X-8.2	0.9215
		D3	Y=-5110.8X-9.0	0.9333
		D4	Y=-4875.2X-9.4	0.9257
60SS40RC		O1	Y=-8135.8X-3.1	0.9002
		O2	Y=-8459.8X-5.2	0.8863
		O3	Y=-9147.2X-7.5	0.8971
	Stage 2	D1	Y=-5658.2X-7.2	0.9187
		D2	Y=-7124.2X-4.5	0.9432
		D3	**Y=-7836.2X-2.2**	**0.9806**
		D4	Y=-7639.4X-1.9	0.9567
		O1	**Y=-4759.4X-9.8**	**0.9803**
		O2	Y=-5315.0X-11.2	0.9234
		O3	Y=-5947.2X-17.5	0.9416
80SS20RC	Stage 1	D1	Y=-4853.0X-4.4	0.8946
		D2	Y=-4107.0X-2.5	0.9025
		D3	Y=-5751.1X-5.7	0.9198

		D4	*Y*=-6074.3*X*-9.2	0.8909
		O1	*Y*=-9174.8*X*-9.9	0.9104
		O2	*Y*=-10315.0*X*-13.2	0.9325
		O3	*Y*=-9947.2*X*-10.5	0.9057
	Stage 2	D1	*Y*=-8198.7*X*-14.4	0.8924
		D2	*Y*=-8207.0*X*-12.2	0.8819
		D3	*Y*=-8375.1*X*-11.7	0.9361
		D4	***Y*=-8421.9*X*-10.9**	**0.9660**
		O1	***Y*=-3835.70*X*-12.4**	**0.9844**
		O2	*Y*=-4705.6*X*-9.2	0.9304
		O3	*Y*=-5122.3*X*-7.8	0.9128
	Stage 1	D1	*Y*=-5068.9*X*-16.0	0.8656
		D2	*Y*=-5397.1*X*-14.4	0.8874
		D3	*Y*=-5308.2*X*-13.0	0.8512
		D4	*Y*=-5742.3*X*-8.6	0.8975
40DSS60RC		O1	***Y*=-8204.2*X*+15.9**	**0.9787**
		O2	*Y*=-9021.6*X*+18.2	0.9501
		O3	*Y*=-9877.4*X*+21.5	0.9534
	Stage 2	D1	*Y*=-9107.8*X*+24.3	0.9011
		D2	*Y*=-9589.1*X*+29.2	0.9226
		D3	*Y*=-11021.3*X*+19.7	0.8998
		D4	*Y*=-9698.2*X*+9.8	0.9115

Table S3. The kinetic parameters of 40SS60RC and 40DSS60RC.

Samples	Stage 1			Stage 2		
	E_a (kJ/mol)	Model	R^2	E_a (kJ/mol)	Model	R^2
40SS60RC	30.21	O1	0.9691	51.39	O1	0.9573
40DSS60RC	31.89	O1	0.9844	68.21	O1	0.9678

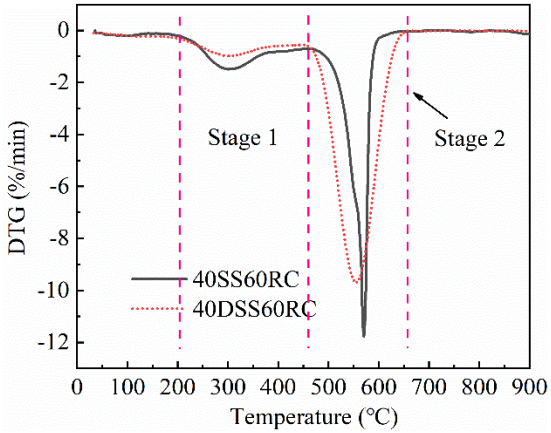

Figure S1. Comparison of the DTG results of 40SS60RC and 40DSS60RC.