

Supplementary Materials

Study of the physicochemical properties of specialty carbon black and its catalytic pyrolysis performance

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Table S1. Physical and chemical analysis results of different CB.

Project	CB									
	reference	a	b	c	d	e	f	g	h	j
Iodine absorption value $/(g \cdot kg^{-1})$	78.7	155	158	161	142	139	154	139	122	119
Oil absorption value \times $10^5/(m^3 \cdot kg^{-1})$	100	131	135	140	131	126	125	115	115	110
Compression oil absorption value $\times 10^5$ $/(m^3 \cdot kg^{-1})$	84.2	102	110	106	93	96	95	102	110	106
Nitrogen adsorption specific surface area \times $10^{-3}/(m^2 \cdot kg^{-1})$	81.6	128	125	135	102	103	107	128	125	98
O content (%)	--	2.9	2.4	1.9	1.1	0.8	0.7	3.4	5.1	4.3
Φ value	0.36	0.29	0.29	0.28	0.29	0.31	0.30	0.33	0.33	0.34
D50 (μm)	13	5.93	2.87	0.23	4.45	3.32	2.05	1.81	1.60	2.38
D97 (μm)	36	12.65	7.49	14.95	10.25	7.49	5.48	5.04	4.01	6.49

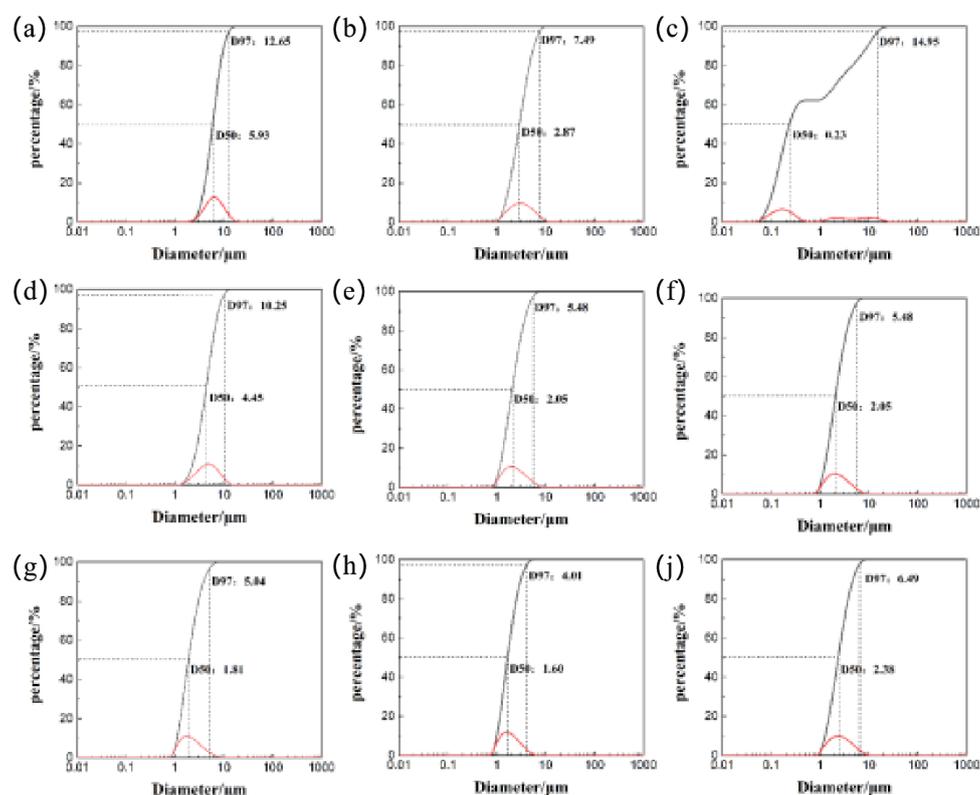
**Figure S1.** The particle size distribution and cumulative particle size distribution curve of $CB_{(a-j)}$.

Table S2. CB/AP composite particle peak temperature model formula.

Argument	Dependent variable	Equation	Formula	Linear formula after variable transformation
Oil absorption value	High-temperature decomposition peak	Quadratic function	$Y_1 = 1032.67 - 9.618x + 0.038x^2$	$Y_1 = 1032.67 - 9.618x + 0.038x_1(x_1 = x^2)$
Compression oil absorption value		Logarithmic function	$Y_2 = 145.537 + 62.365 \ln(x)$	$Y_2 = 145.537 + 62.365x_1(x_1 = \ln(x))$
O content		S-function	$Y_3 = e^{(6.085-0.02/x)}$	/

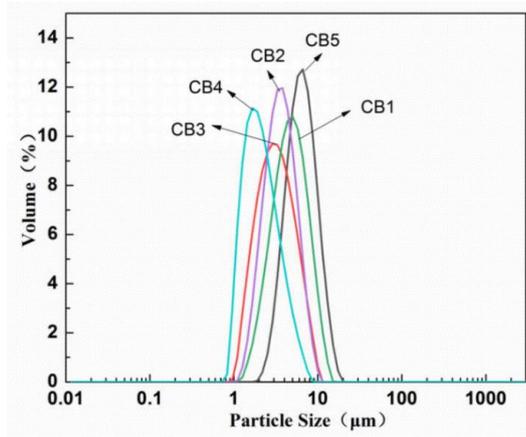


Figure S2. Particle size distribution of CB samples prepared at different cracking temperatures.

Table S3. Self-made CB structural parameter model formula.

Argument	Dependent variable	Equation	Formula	Linear formula after variable transformation
Pyrolysis temperatures	Oil absorption value	S-function	$Y = e^{(0.952-0.089/x)}$	/
	Φ value	Logarithmic function	$Y = 0.952 - 0.089 \ln(x)$	$Y = 0.952 - 0.089x_1(x_1 = \ln(x))$