Supplementary Material for "Pyrolysis characteristics and non-isothermal kinetics of integrated circuits"

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Table S1. Common reaction kinetics models and mechanism functions.

Code	Reaction model	Differential function $f(x)$	Integral function $F(x)$
A1	Nuclei production (n=1)	$1-x$	$-\ln(1-x)$
A2	Nuclei production (n=1.5)	$1.5(1-x)[-\ln(1-x)]^{1/3}$	$3(1-x)^{2/3}\left[1-(1-x)^{1/3}\right]$
A3	Nuclei production (n=2)	$2(1-x)[-\ln(1-x)]^{1/2}$	$[-\ln(1-x)]^{1/2}$
A4	Nuclei production (n=3)	$3(1-x)[-\ln(1-x)]^{2/3}$	$[-\ln(1-x)]^{1/3}$
A5	Nuclei production (n=4)	$4(1-x)[-\ln(1-x)]^{3/4}$	$[-\ln(1-x)]^{1/4}$
A6	Nuclei production (n=3/4)	$(3/4)(1-x)[-\ln(1-x)]^{1/4}$	$[-\ln(1-x)]^{3/4}$
C1	Phase boundary reaction (n=2)	$(1-x)^2$	$(1-x)^{-1}-1$
C2	Phase boundary reaction (n=3/2)	$2(1-x)^{3/2}$	$(1-x)^{-1/2}$
D1	Dimensional diffusion	$1/2x$	x^2
D2	Two-dimensional diffusion	$[-\ln(1-x)]^{-1}$	$x+(1-x)\ln(1-x)$
D3	Three-dimensional diffusion	$(3/2)[(1-x)^{-1/3}-1]^{-1}$	$[1-(2/3)x]-(1-x)^{2/3}$
D4	Three-dimensional diffusion	$(3/2)(1-x)^{2/3}[1-(1-x)^{2/3}]^{-1}$	$[1-(1-x)^{1/3}]^2$
D5	3-D diffusion (anti- Jander)	$(3/2)(1+x)^{2/3}[(1+x)^{1/3}-1]^{-1}$	$[(1+x)^{1/3}-1]^2$
D6	3-D diffusion (ZLT)	$(3/2)(1-x)^{4/3}[(1-x)^{-1/3}-1]^{-1}$	$[(1-x)^{-1/3}-1]^2$
D7	3-D diffusion (Jander)	$6(1-x)^{2/3}[1-(1-x)^{1/3}]^{1/2}$	$[1-(1-x)^{1/3}]^{1/2}$
D8	2-D diffusion (Jander)	$(1-x)^{1/2}[1-(1-x)^{1/2}]^{-1}$	$[1-(1-x)^{1/2}]^2$
R1	Shrinking core model	$2(1-x)^{1/2}$	$1-(1-x)^{1/2}$
R2	Shrinking core model	$3(1-x)^{2/3}$	$1-(1-x)^{1/3}$
R3	Shrinking core model (n=2)	$(1/2)(1-x)^{-1}$	$1-(1-x)^2$
R4	Shrinking core model (n=3)	$(1/3)(1-x)^{-2}$	$1-(1-x)^3$
R5	Shrinking core model (n=4)	$(1/4)(1-x)^{-3}$	$1-(1-x)^4$

Table S2. Comparison of activation energy obtained in this study with studies reported in literature.

Sample	Methods	Stream	E_a (kJ·mol^{-1})	Ref.
Electronic waste-non metallic fraction	CR	N_2	72-74	[S1]
Electronic waste-Printed circuit boards	Vyazovkin	N_2	93-308	[S2]
Electronic waste-Printed circuit boards	CR	N_2	149.28	[S3]
Electronic waste-Printed circuit boards	Friedman	N_2	86-193	[33]
Integrated circuits	Friedman, Kissinger, and CR	N_2	145-208	This study

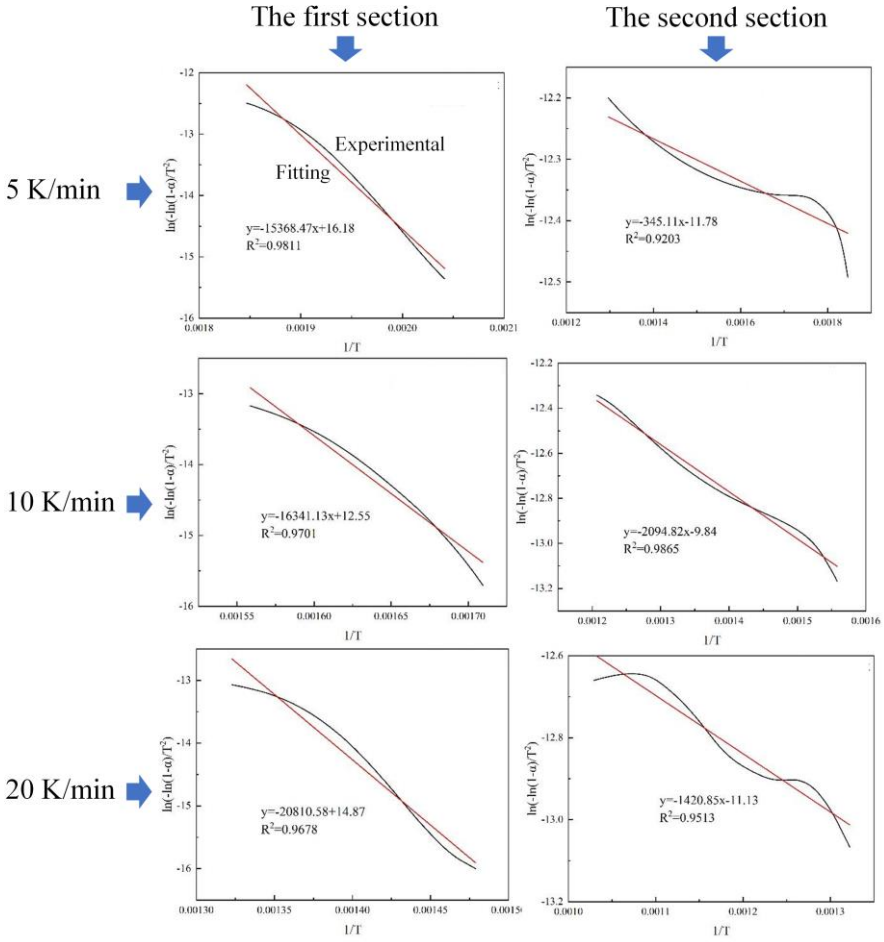

Figure S1. The linear regression for the extraction of the kinetic parameters from CR method.

References

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