Supplementary File

Kinetic Formation of Iron oxide Nanoparticles using un- and γ-irradiated Singular Molecular Precursor of Tris(pentanedionato)iron(III) Complex

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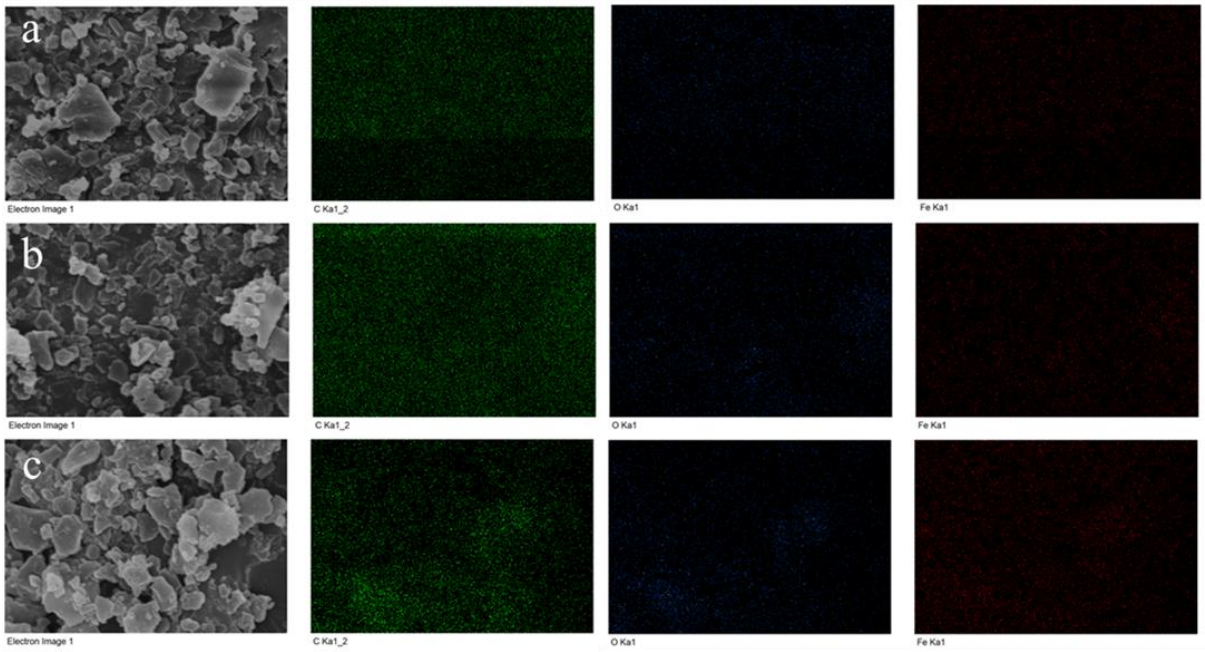

Figure S1: Elemental mapping of un-irradiated (a) and γ irradiated tris(2,4 pentanedionato)iron(III) with 100 (b) and 300 kGy (c), respectively

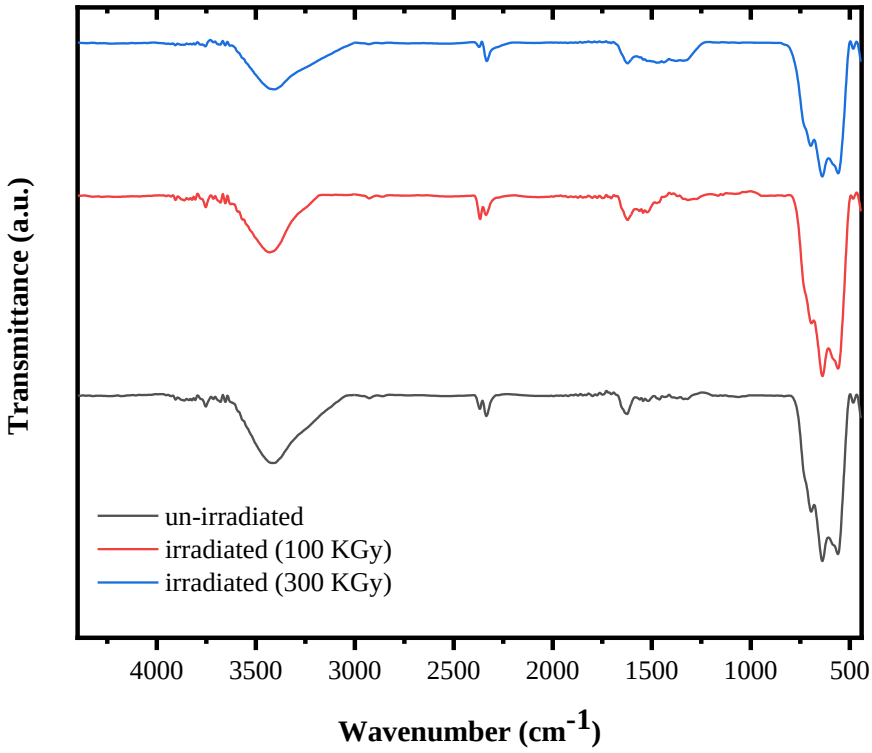

Figure S2: FTIR spectra of the solid residues obtained from pyrolysis of un-irradiated and γ-irradiated tris(2,4-pentanedionato)iron(III) precursors with 100 and 300 kGy, respectively.

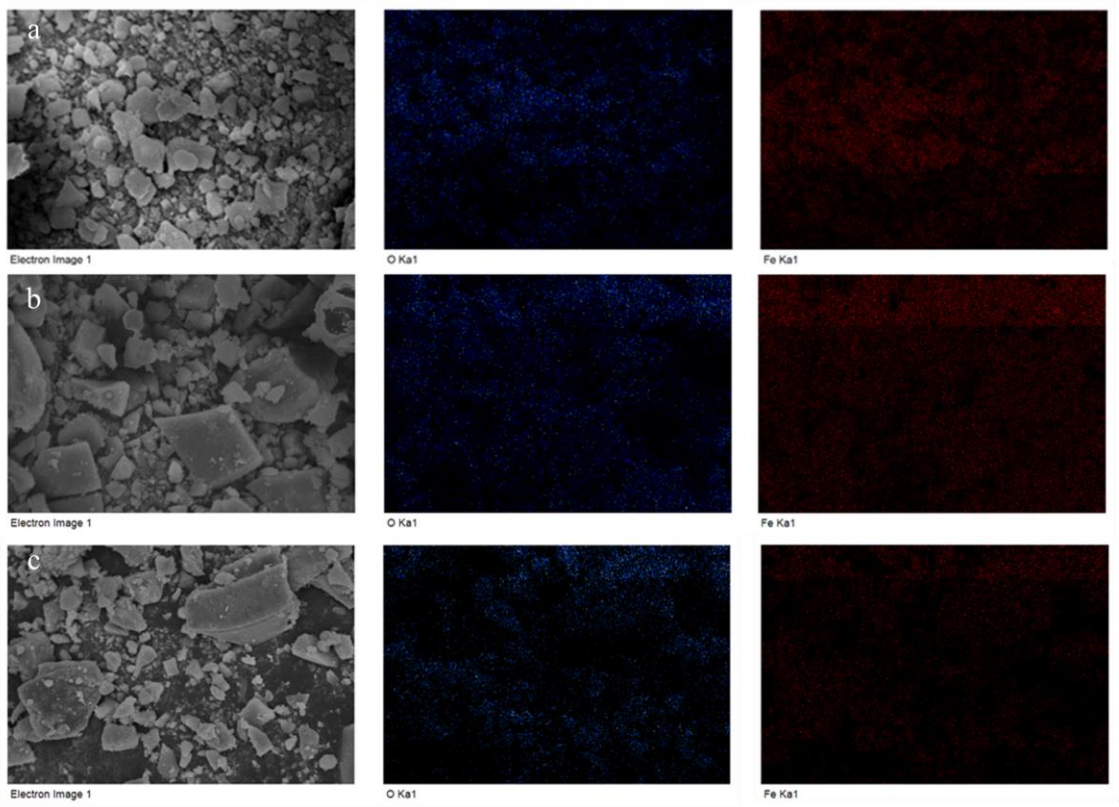

Figure S3: Elemental mapping of un-irradiated (a and d) and γ-irradiated of the solid residues obtained from pyrolysis of tris(2,4-pentanedionato)iron(III) precursors with 100 (b and e) and 300 kGy (c and f), respectively.

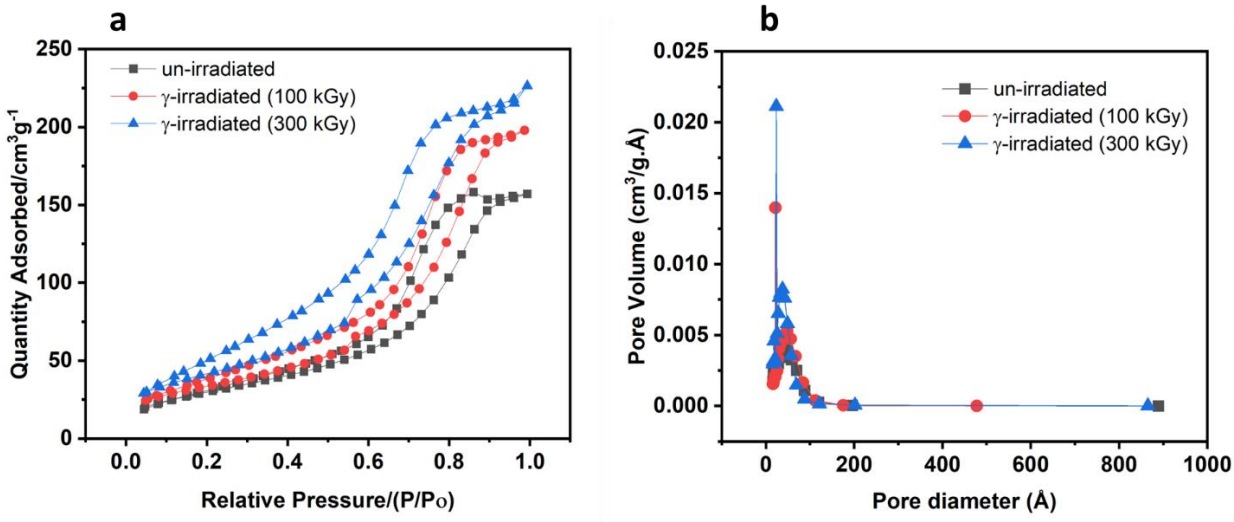

Figure S4: Isotherms (a) and Pore distribution curves (b), based on the BET and BJH method, respectively for un-irradiated and γ-irradiated of the solid residues obtained from pyrolysis of tris(2,4-pentanedionato)iron(III) precursors with 100 and 300 kGy, respectively.

Table A: Algebraic expressions of f(α) and g(α) for the reaction models considered in the present work.

No.	Symbol	Reaction model	f(α)	g(α)
1	D_1	One-dimensional diffusion	$1/2\alpha$	α^2
2	D_2	Two-dimensional diffusion (bi-dimensional particle shape) Valensi equation	$1/[-Ln(1-\alpha)]$	$(1-\alpha)Ln(1-\alpha)+\alpha$
3	D_3	Three-dimensional diffusion (tri-dimensional particle shape) Jander equation	$3(1-\alpha)^{1/3}/2[(1-\alpha)^{-1/3}-1]$	$[1-(1-\alpha)^{1/3}]^2$

4	D_4	Three-dimensional diffusion (tri-dimensional particle shape) Ginstling–Brounshtein	$3/2[(1-\alpha)^{-1/3}-1]$	$(1-2\alpha/3)(1-\alpha)^{2/3}$
5	R_2	Phase-boundary controlled reaction (contracting area, i.e., bi-dimensional shape)	$2(1-\alpha)^{1/2}$	$[1-(1-\alpha)^{1/2}]$
6	R_3	Phase-boundary controlled reaction (contracting volume, i.e., tri-dimensional shape)	$3(1-\alpha)^{2/3}$	$[1-(1-\alpha)^{1/3}]$
7	F_1	First-order (Mampel)	$(1-\alpha)$	$[-Ln(1-\alpha)]$
8	F_2	Second-order	$(1-\alpha)^2$	$(1-\alpha)^{-1}-1$
9	F_3	Third-order	$(1-\alpha)^3$	$(1/2)[(1-\alpha)^{-2}-1]$
10	$F_{3/2}$	Three-halves order	$(1-\alpha)^{3/2}$	$2[(1-\alpha)^{-1/2}-1]$
11	A_2	Avrami-Erofe´ev (n = 2)	$2((1-\alpha))[-Ln((1-\alpha))]^{1/2}$	$[-Ln(1-\alpha)]^{1/2}$
12	A_3	Avrami-Erofe´ev (n = 3)	$3((1-\alpha))[-Ln((1-\alpha))]^{2/3}$	$[-Ln(1-\alpha)]^{1/3}$
13	$A_{3/2}$	Avrami-Erofe´ev (n = 3/2)	$3/2((1-\alpha))[-Ln((1-\alpha))]^{1/3}$	$[-Ln(1-\alpha)]^{2/3}$
14	A_4	Avrami-Erofe´ev (n = 4)	$4((1-\alpha))[-Ln((1-\alpha))]^{3/4}$	$[-Ln(1-\alpha)]^{1/4}$
15	P_1	Power Law	$4\alpha^{3/4}$	$\alpha^{1/4}$
16	P_2	Power Law	$3\alpha^{2/3}$	$\alpha^{2/3}$
17	P_3	Power Law	$2\alpha^{1/2}$	$\alpha^{1/2}$
18	P_4	Power Law	$2/3\alpha^{-1/2}$	$\alpha^{3/2}$

Table B: Kinetic parameter determined by CR method for un-irradiated sample.

#	β (C°/min)	5			10			15			20			25			Mean		
	Model	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA
1	D_1	0.9853	179.60	30.85	0.9374	179.64	29.17	0.9990	195.30	32.59	0.9998	188.61	29.44	0.9672	173.96	26.53	0.9777	183.42	29.72
2	D_2	0.9760	195.56	34.40	0.9495	197.70	33.08	0.9990	213.65	36.54	0.9986	206.37	33.11	0.9725	190.97	30.07	0.9791	200.85	33.44
3	D_3	0.9583	215.95	38.28	0.9614	221.54	37.61	0.9919	237.24	40.98	0.9896	212.58	37.19	0.9748	213.25	34.08	0.9752	220.11	37.63
4	D_4	0.9707	202.25	34.66	0.9544	205.49	33.55	0.9975	221.39	36.99	0.9964	213.86	33.44	0.9741	198.26	30.37	0.9786	208.25	33.80
5	R_2	0.9652	99.06	11.07	0.9532	100.80	10.52	0.9960	108.71	12.23	0.9945	104.75	10.39	0.9726	96.94	8.86	0.9763	102.05	10.62
6	R_3	0.9555	104.08	11.99	0.9583	106.67	11.61	0.9914	114.52	13.29	0.9889	110.37	11.36	0.9728	102.43	9.81	0.9734	107.61	11.61
7	F_1	0.9310	115.15	16.02	0.9641	119.79	16.03	0.9764	127.35	17.61	0.9717	122.81	15.50	0.9684	114.66	13.93	0.9623	119.95	15.82
8	F_2	0.8317	156.53	26.92	0.9438	170.13	28.72	0.8970	175.54	29.70	0.8857	169.57	26.88	0.9202	161.28	25.41	0.8957	166.61	27.53
9	F_3	0.7404	207.69	40.38	0.8972	233.15	44.58	0.8147	235.31	44.67	0.7995	227.59	40.98	0.8571	219.49	39.71	0.8218	224.65	42.06
10	$F_{3/2}$	0.8839	134.37	21.08	0.9602	143.00	21.89	0.9410	149.71	23.23	0.9328	144.50	20.78	0.9495	136.19	19.24	0.9335	141.55	21.24
11	A_2	0.9222	53.68	0.86	0.9587	55.80	0.81	0.9734	59.58	1.61	0.9679	57.17	0.52	0.9637	53.13	-0.26	0.9572	55.87	0.71
12	A_3	0.9115	33.19	-4.20	0.9521	34.46	-4.26	0.9699	36.98	-3.73	0.9632	35.29	-4.48	0.9578	32.63	-4.99	0.9509	34.51	-4.33
13	$A_{3/2}$	0.9268	74.17	5.91	0.9615	77.13	5.88	0.9750	82.17	6.94	0.9699	79.05	5.51	0.9662	73.64	4.47	0.9599	77.23	5.74
14	A_4	0.8984	22.94	-6.72	0.9438	23.80	-6.80	0.9655	25.69	-6.40	0.9574	24.35	-6.98	0.9503	22.37	-7.35	0.9431	23.83	-6.85
15	P_1	0.9729	15.63	-8.66	0.8687	15.28	-8.96	0.9976	17.24	-8.53	0.9993	16.17	-8.98	0.9675	12.74	-9.69	0.9612	15.41	-8.96
16	P_2	0.9829	54.70	0.76	0.9243	54.44	0.13	0.9988	59.66	1.27	0.9998	57.26	0.18	0.9596	52.43	0.78	0.9731	55.70	0.62
17	P_3	0.9815	39.06	-3.01	0.9162	38.76	-3.51	0.9986	42.67	-2.65	0.9997	40.80	-3.49	0.9548	37.20	-4.20	0.9702	39.70	-3.37
18	P_4	0.9850	132.75	19.56	0.9355	132.68	18.27	0.9990	144.42	20.84	0.9998	139.34	18.47	0.9661	128.38	16.29	0.9771	135.52	18.69

Table C: Kinetic parameter determined by CR method for γ-irradiated sample (100 kGy).

#	β (C°/min)	5			10			15			20			25			Mean		
	Model	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA
1	D_1	0.9972	210.06	37.67	0.9834	188.40	31.60	0.9902	176.97	27.66	0.9974	182.33	28.62	0.9997	173.06	25.65	0.9936	186.16	30.24
2	D_2	0.9960	227.80	41.58	0.9863	204.78	35.12	0.9966	192.76	30.94	0.9998	198.36	31.93	0.9967	187.91	28.61	0.9951	202.32	33.64
3	D_3	0.9899	249.65	45.74	0.9861	225.13	38.83	0.9997	218.19	35.36	0.9975	218.19	35.36	0.9879	206.24	31.61	0.9922	223.48	37.38
4	D_4	0.9945	235.00	41.95	0.9868	211.48	35.33	0.9983	199.22	31.05	0.9996	204.90	32.05	0.9943	193.94	28.59	0.9947	208.91	33.79
5	R_2	0.9930	115.47	14.71	0.9859	103.52	11.35	0.9988	97.20	9.15	0.9991	100.01	9.61	0.9922	94.37	7.87	0.9938	102.11	10.54
6	R_3	0.9894	120.85	15.70	0.9851	108.52	12.23	0.9996	102.02	9.95	0.9974	104.92	10.46	0.9870	98.89	8.57	0.9917	107.04	11.38
7	F_1	0.9785	132.53	19.82	0.9802	119.42	16.11	0.9975	112.51	13.68	0.9897	115.54	14.19	0.9728	108.69	12.07	0.9837	117.74	15.18
8	F_2	0.9242	174.82	30.74	0.9428	159.13	26.25	0.9651	150.68	23.20	0.9418	154.12	23.75	0.9075	144.27	20.77	0.9363	156.60	24.94
9	F_3	0.8620	226.42	44.04	0.8924	207.77	38.64	0.9169	197.43	34.42	0.8830	201.31	35.42	0.8377	187.73	31.37	0.8784	204.13	36.78
10	$F_{3/2}$	0.9544	152.35	24.94	0.9650	138.00	20.86	0.9853	130.37	18.14	0.9693	133.60	18.67	0.9431	125.36	16.15	0.9634	135.94	19.75
11	A_2	0.9760	62.28	2.74	0.9776	55.68	0.87	0.9972	52.10	-0.38	0.9883	53.60	-0.12	0.9686	50.11	-1.20	0.9815	54.75	0.38
12	A_3	0.9731	38.87	-2.96	0.9745	34.43	-4.21	0.9969	31.97	5.06	0.9866	32.95	-4.90	0.9634	30.59	-5.62	0.9789	33.76	-2.52
13	$A_{3/2}$	0.9773	85.70	8.43	0.9790	76.92	5.95	0.9974	74.24	4.65	0.9890	74.24	4.65	0.9708	69.64	3.23	0.9827	76.15	5.38
14	A_4	0.9695	27.16	-5.80	0.9705	23.80	-6.80	0.9965	21.90	-7.40	0.9844	22.62	-7.28	0.9566	20.82	-7.83	0.9755	23.26	-7.02
15	P_1	0.9951	19.30	-7.84	0.9659	16.48	-8.63	0.9760	15.49	-9.06	0.9930	15.49	-9.06	0.9916	11.42	-10.08	0.9843	15.64	-8.93
16	P_2	0.9968	64.75	3.01	0.9800	57.45	0.96	0.9877	53.49	-0.39	0.9966	55.24	-0.08	0.9997	52.07	-1.09	0.9922	56.60	0.48
17	P_3	0.9965	46.55	-1.34	0.9780	41.04	-2.88	0.9861	38.01	-3.91	0.9961	39.32	-3.67	0.9997	36.91	-4.44	0.9913	40.37	-3.25
18	P_4	0.9972	155.56	24.67	0.9829	139.28	20.11	0.9899	130.66	17.14	0.9973	134.66	17.86	0.9997	127.68	15.62	0.9934	137.57	19.08

Table D: Kinetic parameter determined by CR method for γ-irradiated sample (300 kGy).

#	β (C°/min)	5			10			15			20			25			Mean		
	Model	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA
1	D_1	0.9965	204.30	36.42	0.9240	163.41	25.45	0.9985	180.90	28.61	0.9928	171.29	25.79	0.9949	169.71	24.96	0.9813	177.92	28.25
2	D_2	0.9958	223.31	40.67	0.9401	180.29	29.10	0.9993	198.07	32.23	0.9961	187.88	29.22	0.9960	185.90	28.25	0.9855	195.09	31.89
3	D_3	0.9882	247.77	45.51	0.9569	202.62	33.30	0.9933	220.17	36.24	0.9937	209.36	33.02	0.9911	206.79	31.86	0.9846	217.34	35.99
4	D_4	0.9941	231.33	41.25	0.9466	187.58	29.46	0.9932	205.32	32.53	0.9962	194.91	29.45	0.9952	192.74	28.42	0.9851	202.38	32.22
5	R_2	0.9923	113.89	14.43	0.9453	91.72	8.45	0.9970	100.50	9.96	0.9956	95.19	8.38	0.9940	94.01	7.84	0.9848	99.06	9.81
6	R_3	0.9876	119.91	15.58	0.9530	97.22	9.45	0.9929	105.94	10.91	0.9933	100.48	9.29	0.9905	99.15	8.70	0.9835	104.54	10.79
7	F_1	0.9724	133.22	20.13	0.9639	109.53	13.69	0.9789	117.98	15.01	0.9830	112.21	13.28	0.9779	110.55	12.58	0.9752	116.70	14.94
8	F_2	0.8939	183.22	33.04	0.9565	156.81	25.70	0.9024	163.22	26.27	0.9163	156.59	24.20	0.9063	153.51	23.06	0.9151	162.67	26.46
9	F_3	0.8123	245.24	49.04	0.9174	216.06	40.72	0.8218	219.37	40.22	0.8414	211.81	37.76	0.8289	206.88	36.05	0.8444	219.87	40.76
10	$F_{3/2}$	0.9373	156.41	26.12	0.9655	137.85	20.83	0.9450	138.96	20.24	0.9545	132.77	18.34	0.9465	130.46	17.44	0.9498	139.29	20.59
11	A_2	0.9693	62.64	2.90	0.9577	50.67	-0.36	0.9760	54.84	0.29	0.9806	51.91	-0.59	0.9747	51.03	-0.95	0.9717	54.22	0.26
12	A_3	0.9656	39.11	-2.85	0.9498	31.05	-5.04	0.9725	33.80	-4.61	0.9776	31.80	-5.21	0.9706	31.20	-5.45	0.9672	33.39	-4.63
13	$A_{3/2}$	0.9709	86.17	8.64	0.9609	70.29	4.32	0.9775	75.89	5.20	0.9819	72.01	4.04	0.9764	70.87	3.56	0.9735	75.04	5.15
14	A_4	0.9610	27.35	-5.72	0.9398	21.24	-7.38	0.9680	23.27	-7.07	0.9736	21.75	-7.52	0.9653	21.28	-7.71	0.9615	22.98	-7.08
15	P_1	0.9935	18.59	-7.99	0.8288	13.27	-9.42	0.9958	15.35	-9.05	0.9815	14.06	-9.42	0.9930	11.33	-10.09	0.9585	14.52	-9.19
16	P_2	0.9959	62.84	2.59	0.9064	49.04	-1.11	0.9980	54.80	-0.07	0.9909	51.53	-1.03	0.9935	50.95	-1.32	0.9769	53.83	-0.19
17	P_3	0.9956	45.12	-1.65	0.8954	34.72	-4.44	0.9977	39.00	-3.67	0.9897	36.52	-4.39	0.9926	36.07	-4.61	0.9742	38.29	-3.75
18	P_4	0.9964	151.24	23.73	0.9214	120.51	15.49	0.9984	133.60	17.85	0.9926	126.37	15.73	0.9947	125.17	15.10	0.9807	131.38	17.58

Table E: Kinetic parameter determined by CK method for un-irradiated sample.

#	β (C°/min)	5			10			15			20			25			Mean		
	Model	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA
1	D_1	0.9844	176.64	38.87	0.9366	177.45	38.06	0.9990	193.11	41.90	0.9999	186.85	39.14	0.9668	172.08	36.42	0.9773	181.22	38.88
2	D_2	0.9748	192.60	42.41	0.9489	195.50	41.97	0.9989	211.47	45.85	0.9985	204.61	42.81	0.9721	189.08	39.96	0.9786	198.65	42.60
3	D_3	0.9566	212.99	46.30	0.9609	219.34	46.51	0.9916	235.05	50.28	0.9892	227.45	46.88	0.9743	211.36	43.96	0.9745	221.24	46.79
4	D_4	0.9693	199.29	42.68	0.9538	203.29	42.44	0.9973	219.20	46.29	0.9963	212.09	43.13	0.9737	196.36	40.25	0.9781	206.05	42.96
5	R_2	0.9619	96.10	19.08	0.9519	98.60	19.42	0.9956	106.53	21.54	0.9940	102.99	20.09	0.9715	95.05	18.75	0.9750	99.85	19.78
6	R_3	0.9517	101.12	20.01	0.9571	104.47	20.50	0.9907	112.33	22.59	0.9887	108.61	21.06	0.9717	100.53	19.70	0.9720	105.41	20.77
7	F_1	0.9262	112.19	24.03	0.9629	117.59	24.92	0.9750	125.17	26.92	0.9703	121.04	25.19	0.9669	112.76	23.82	0.9603	117.75	24.98
8	F_2	0.8251	153.57	34.93	0.9419	167.93	37.62	0.8940	173.36	39.01	0.8829	167.81	36.58	0.9176	159.38	35.30	0.8923	164.41	36.69
9	F_3	0.7340	204.73	48.39	0.8948	230.95	53.48	0.8113	233.13	53.98	0.7965	225.83	50.68	0.8542	217.60	49.60	0.8182	222.45	51.22
10	$F_{3/2}$	0.8779	131.41	29.10	0.9587	140.81	30.78	0.9387	147.52	32.53	0.9306	142.74	30.48	0.9474	134.30	29.13	0.9307	139.35	30.40
11	A_2	0.9104	50.72	8.87	0.9557	53.60	9.71	0.9702	57.39	10.91	0.9646	55.41	10.21	0.9599	51.24	9.63	0.9522	53.67	9.87
12	A_3	0.8893	30.23	3.82	0.9462	32.27	4.64	0.9639	34.80	5.58	0.9571	33.53	5.22	0.9507	30.73	4.90	0.9414	32.31	4.83
13	$A_{3/2}$	0.9188	71.21	13.92	0.9595	74.93	14.78	0.9728	79.98	16.25	0.9676	77.29	15.20	0.9637	71.75	14.36	0.9565	75.03	14.90
14	A_4	0.8607	19.98	1.29	0.9334	21.60	2.10	0.9554	23.50	2.91	0.9470	22.59	2.72	0.9380	20.48	2.53	0.9269	21.63	2.31
15	P_1	0.9493	12.67	-0.64	0.8408	13.08	-0.06	0.9977	15.05	0.78	0.9998	14.40	0.72	0.9092	12.51	0.56	0.9394	13.54	0.27
16	P_2	0.9793	51.74	8.77	0.9207	52.25	9.03	0.9988	57.48	10.58	0.9998	55.49	9.87	0.9577	50.53	9.11	0.9713	53.50	9.47
17	P_3	0.9758	36.10	5.00	0.9103	36.56	5.39	0.9987	40.49	6.65	0.9998	39.04	6.21	0.9518	35.31	5.68	0.9673	37.50	5.79
18	P_4	0.9837	129.79	27.58	0.9343	130.48	27.17	0.9990	142.24	30.15	0.9999	137.58	28.16	0.9655	126.48	26.17	0.9765	133.31	27.85

Table F: Kinetic parameter determined by CK method for γ-irradiated sample (100 kGy).

#	β (C°/min)	5			10			15			20			25			Mean		
	Model	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA
1	D_1	0.9971	207.44	45.77	0.9830	185.98	40.45	0.9903	174.95	37.01	0.9975	180.39	38.27	0.9997	171.29	35.56	0.9935	184.01	39.41
2	D_2	0.9957	225.18	49.68	0.9859	202.37	43.96	0.9967	190.74	40.28	0.9998	196.41	41.58	0.9965	186.13	38.53	0.9949	200.17	42.81
3	D_3	0.9895	247.03	53.84	0.9856	222.72	47.67	0.9996	210.34	43.68	0.9974	216.25	45.01	0.9874	204.47	41.52	0.9919	220.16	46.34
4	D_4	0.9942	232.39	50.05	0.9864	209.07	44.18	0.9983	197.20	40.39	0.9996	202.95	41.70	0.9940	192.18	38.51	0.9945	206.76	42.96
5	R_2	0.9923	112.85	22.81	0.9850	101.11	20.19	0.9989	95.18	18.50	0.9991	98.09	19.30	0.9914	92.60	17.78	0.9933	99.96	19.72
6	R_3	0.9884	118.23	23.80	0.9841	106.11	21.07	0.9996	100.00	19.30	0.9971	102.98	20.11	0.9860	97.12	18.49	0.9910	104.89	20.55
7	F_1	0.9770	129.91	27.92	0.9788	117.01	24.96	0.9971	110.49	23.02	0.9889	113.59	23.85	0.9712	106.92	21.99	0.9826	115.59	24.35
8	F_2	0.9214	172.19	38.84	0.9403	156.72	35.09	0.9636	148.66	32.54	0.9397	152.17	33.41	0.9046	142.50	30.69	0.9339	154.45	34.11
9	F_3	0.8587	223.81	52.14	0.8893	205.36	47.48	0.9147	195.41	44.18	0.8804	199.35	45.07	0.8344	185.96	41.29	0.8755	201.98	46.03
10	$F_{3/2}$	0.9522	149.73	33.04	0.9630	135.59	29.71	0.9844	128.36	27.48	0.9679	131.65	28.32	0.9407	123.59	26.07	0.9616	133.78	28.92
11	A_2	0.9726	59.67	10.84	0.9743	53.26	9.72	0.9964	50.08	8.97	0.9865	51.65	9.53	0.9647	48.34	8.72	0.9789	52.60	9.55
12	A_3	0.9668	36.25	5.14	0.9681	32.02	4.64	0.9954	29.95	4.29	0.9832	31.00	4.76	0.9559	28.82	4.30	0.9739	31.61	4.62
13	$A_{3/2}$	0.9750	83.08	16.53	0.9767	74.51	14.80	0.9968	70.22	13.65	0.9878	72.29	14.30	0.9682	67.87	13.14	0.9809	73.60	14.49
14	A_4	0.9591	24.54	2.30	0.9597	21.39	2.09	0.9939	19.88	1.94	0.9785	20.67	2.37	0.9435	19.05	2.08	0.9669	21.11	2.16
15	P_1	0.9926	16.68	0.26	0.9553	14.07	0.22	0.9741	12.84	0.18	0.9938	13.54	0.59	0.9986	12.45	0.46	0.9829	13.92	0.34
16	P_2	0.9964	62.13	11.10	0.9786	55.04	9.80	0.9878	51.47	8.95	0.9969	53.30	9.57	0.9995	50.30	8.83	0.9918	54.45	9.65
17	P_3	0.9959	43.93	6.76	0.9757	38.63	5.97	0.9861	36.00	5.44	0.9965	37.37	5.98	0.9994	35.15	5.48	0.9907	38.22	5.92
18	P_4	0.9970	152.94	32.77	0.9824	136.87	28.95	0.9899	128.63	26.49	0.9974	132.72	27.51	0.9997	125.91	25.54	0.9933	135.41	28.25

Table G: Kinetic parameter determined by CK method for γ-irradiated sample (300 kGy).

#	β (C°/min)	5			10			15			20			25			Mean		
	Model	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA	r^2	Ea	LnA
1	D_1	0.9966	202.93	44.84	0.9962	187.46	40.84	0.9995	180.59	38.37	0.9997	174.43	36.66	0.9999	172.07	35.86	0.9984	183.50	39.31
2	D_2	0.9982	220.27	48.67	0.9997	203.96	44.39	0.9993	196.30	41.63	0.9991	189.67	39.77	0.9976	186.88	38.82	0.9988	199.42	42.65
3	D_3	0.9888	241.64	52.72	0.9969	224.33	48.10	0.9937	215.68	44.99	0.9930	208.50	42.94	0.9897	205.11	41.80	0.9924	219.05	46.11
4	D_4	0.9936	227.31	48.99	0.9987	210.68	44.60	0.9980	202.69	41.73	0.9976	195.88	39.80	0.9955	192.89	38.79	0.9967	205.89	42.78
5	R_2	0.9916	110.25	22.27	0.9982	101.91	20.41	0.9966	97.90	19.16	0.9961	94.47	18.33	0.9933	92.94	17.93	0.9952	99.50	19.62
6	R_3	0.9877	115.52	23.23	0.9965	106.93	21.29	0.9930	102.67	19.95	0.9921	99.10	19.08	0.9885	97.43	18.62	0.9916	104.33	20.43
7	F_1	0.9762	126.93	27.30	0.9893	117.81	25.17	0.9819	113.02	23.64	0.9802	109.17	22.67	0.9752	107.16	22.11	0.9806	114.82	24.18
8	F_2	0.9204	168.23	38.00	0.9436	157.29	35.26	0.9257	150.52	33.01	0.9209	145.70	31.71	0.9139	142.35	30.74	0.9249	152.82	33.74
9	F_3	0.8577	218.61	51.04	0.8871	205.54	47.56	0.8621	196.29	44.42	0.8549	190.32	42.72	0.8477	185.26	41.24	0.8619	199.20	45.40
10	$F_{3/2}$	0.9512	146.29	32.32	0.9699	136.31	29.90	0.9569	130.60	28.04	0.9538	126.28	26.91	0.9474	123.66	26.16	0.9558	132.63	28.67
11	A_2	0.9714	58.16	10.52	0.9869	53.67	9.82	0.9780	51.34	9.28	0.9758	49.44	8.94	0.9696	48.46	8.78	0.9763	52.21	9.47
12	A_3	0.9652	35.24	4.93	0.9837	32.29	4.71	0.9726	30.78	4.49	0.9697	29.53	4.37	0.9619	28.89	4.34	0.9706	31.35	4.57
13	$A_{3/2}$	0.9740	81.08	16.11	0.9882	75.05	14.94	0.9801	71.90	14.07	0.9782	69.35	13.52	0.9726	68.03	13.23	0.9786	73.08	14.37
14	A_4	0.9569	23.78	2.14	0.9792	21.59	2.15	0.9652	20.50	2.10	0.9612	19.58	2.08	0.9512	19.11	2.11	0.9627	20.91	2.12
15	P_1	0.9911	16.09	0.14	0.9905	14.26	0.27	0.9991	13.52	0.35	0.9994	12.80	0.40	0.9996	12.54	0.50	0.9959	13.84	0.33
16	P_2	0.9957	60.61	10.79	0.9952	55.54	9.94	0.9994	53.33	9.41	0.9996	51.32	9.04	0.9999	50.56	8.92	0.9980	54.27	9.62
17	P_3	0.9951	42.78	6.52	0.9946	39.01	6.07	0.9994	37.39	5.78	0.9996	35.89	5.58	0.9998	35.33	5.55	0.9977	38.08	5.90
18	P_4	0.9965	149.54	32.06	0.9960	137.98	29.25	0.9995	132.86	27.51	0.9997	128.25	26.30	0.9999	126.49	25.75	0.9983	135.02	28.17

Table H: Linear fitting results obtained by KAS, T, and FWO for un-irradiated and γ-irradiated (100 and 300 kGy) samples.

Sample	un-irradiated			γ-irradiated (100 kGy)			γ-irradiated (300 kGy)		
α	r^2, KAS	r^2, T	r^2, FWO	r^2, KAS	r^2, T	r^2, FWO	r^2, KAS	r^2, T	r^2, FWO
0.05	0.8361	0.8379	0.8656	0.8957	0.8964	0.9086	0.9700	0.9702	0.9739
0.10	0.8930	0.9016	0.9165	0.9568	0.9587	0.9635	0.9685	0.9681	0.9720
0.15	0.9110	0.9119	0.9253	0.9374	0.9379	0.9457	0.9532	0.9536	0.9597
0.20	0.9032	0.9042	0.9189	0.9345	0.9350	0.9437	0.9538	0.9542	0.9607
0.25	0.8980	0.8990	0.9147	0.9251	0.9257	0.9360	0.9554	0.9558	0.9625
0.30	0.8975	0.8986	0.9147	0.9239	0.9246	0.9355	0.9566	0.9570	0.9637
0.35	0.8960	0.8971	0.9136	0.9254	0.9260	0.9372	0.9596	0.9600	0.9664
0.40	0.8907	0.8918	0.9094	0.9264	0.9271	0.9384	0.9611	0.9615	0.9678
0.45	0.8922	0.8933	0.9108	0.9335	0.9342	0.9445	0.9611	0.9615	0.9679
0.50	0.8910	0.8921	0.9099	0.9312	0.9319	0.9429	0.9622	0.9627	0.9690
0.55	0.8882	0.8893	0.9078	0.9344	0.9351	0.9456	0.9661	0.9665	0.9722
0.60	0.8923	0.8934	0.9113	0.9341	0.9348	0.9456	0.9674	0.9677	0.9733
0.65	0.8880	0.8892	0.9079	0.9372	0.9379	0.9482	0.9698	0.9701	0.9753
0.70	0.8898	0.8910	0.9095	0.9394	0.9400	0.9501	0.9739	0.9742	0.9787
0.75	0.8895	0.8907	0.9094	0.9411	0.9418	0.9516	0.9758	0.9761	0.9803
0.80	0.8894	0.8906	0.9095	0.9432	0.9438	0.9533	0.9792	0.9794	0.9831
0.85	0.8948	0.8959	0.9140	0.9441	0.9447	0.9541	0.9819	0.9821	0.9853
0.90	0.8996	0.9007	0.9180	0.9688	0.9691	0.9741	0.9830	0.9832	0.9862