Supplementary Information: Impact of Iodide Ions on the Speciation of Radiolytic Transients in Molten LiCl-KCl Eutectic Salt Mixtures

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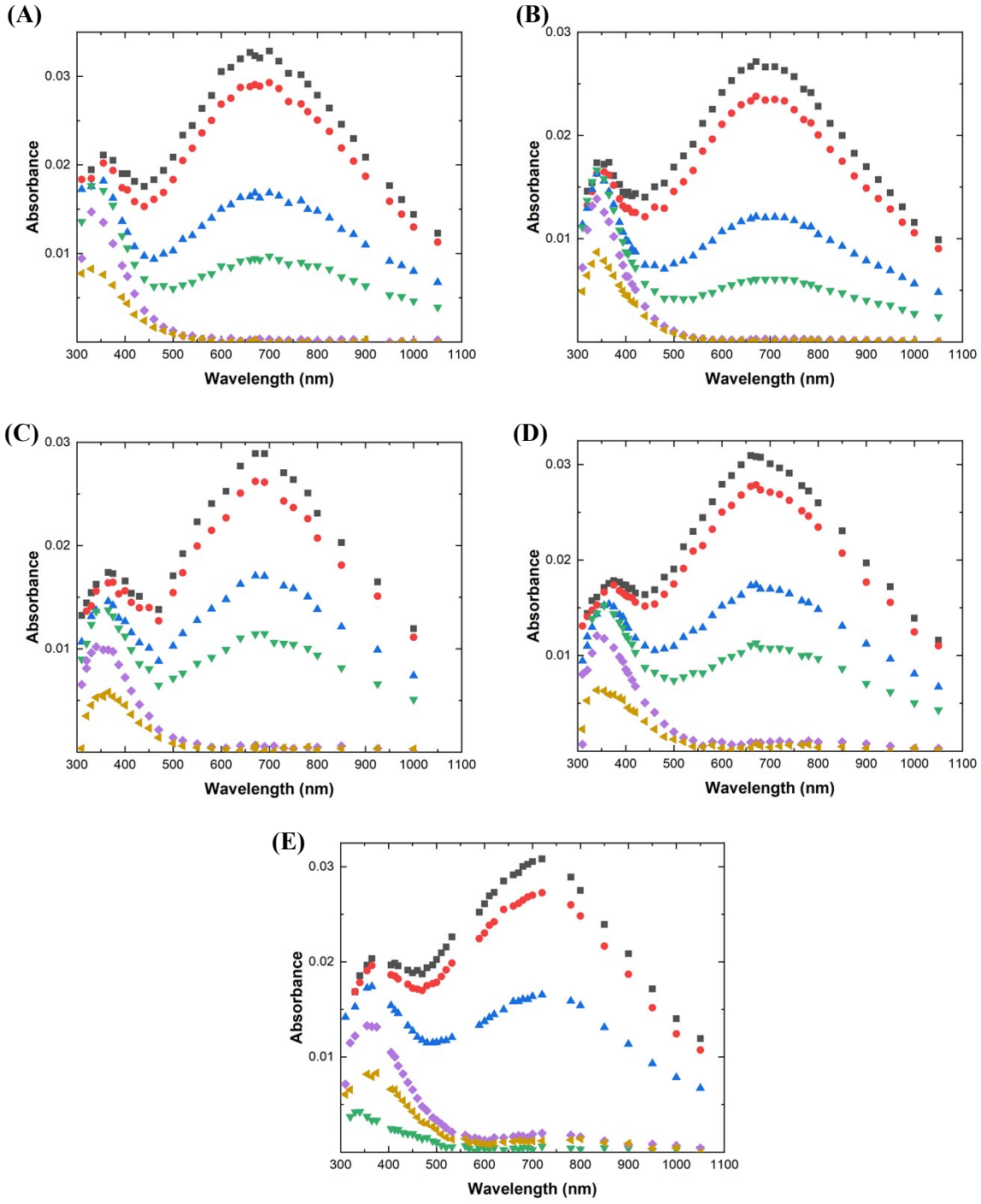

Fig. S1. Transient absorption spectra from the electron pulse irradiation of 0.054 **(A)**, 0.107 **(B)**, 0.536 **(C)**, 1.072 **(D)**, and 5.107 **(E)** wt.% KI in LiCl-KCl eutectic at 400 °C for 5 ns (■), 10 ns (●), 50 ns (□), 100 ns (▼), 1 μs (◆), and 5 μs (♦) normalized by the absorbed dose.

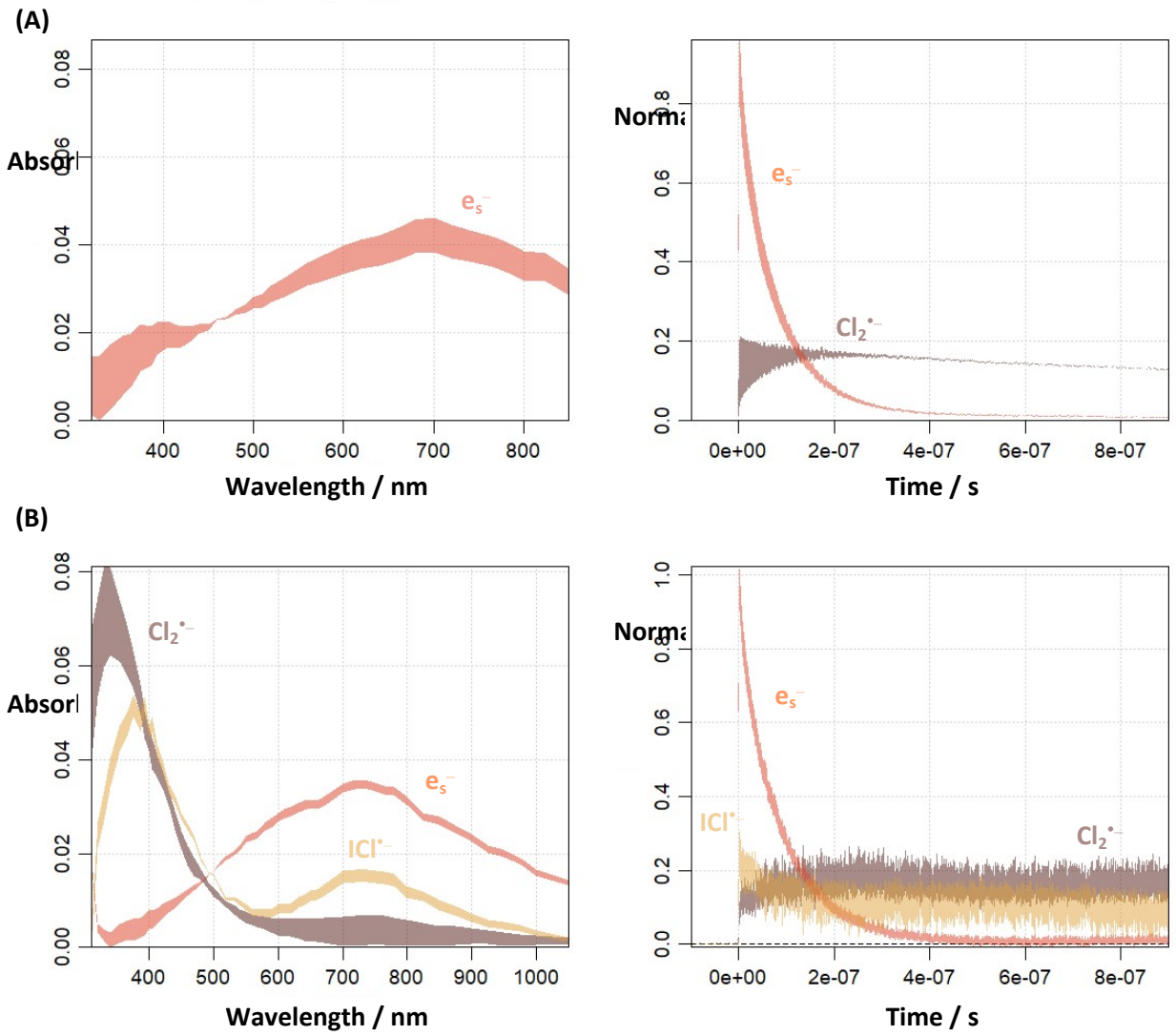

Fig. S2. Ambiguity plots for the kinetics and spectral shapes displayed with equal areas from *SK-Ana* deconvolution of the electron pulse irradiation of neat LiCl-KCl eutectic **(A)** and 10 wt.% KI in LiCl-KCl eutectic **(B)** at 400 °C up to 1 μs. These correspond to the best fit plots given in **Fig. 2** in the manuscript.

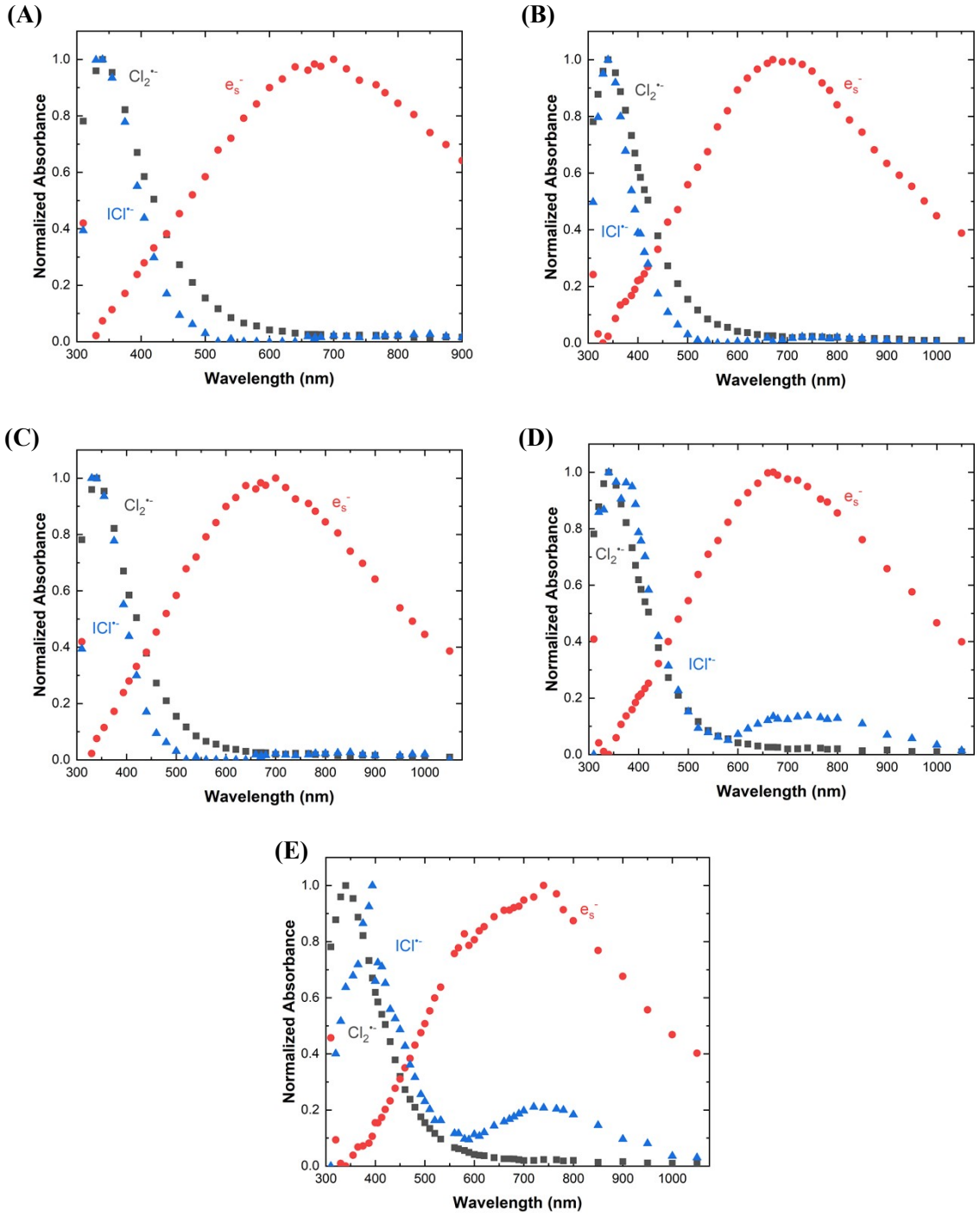

Fig. S3. Normalized spectra from *SK-Ana* deconvolution of the electron pulse irradiation of 0.054 **(A)**, 0.107 **(B)**, 0.536 **(C)**, 1.072 **(D)**, and 5.107 **(E)** wt.% KI in LiCl-KCl eutectic at 400 °C up to 1 μs.

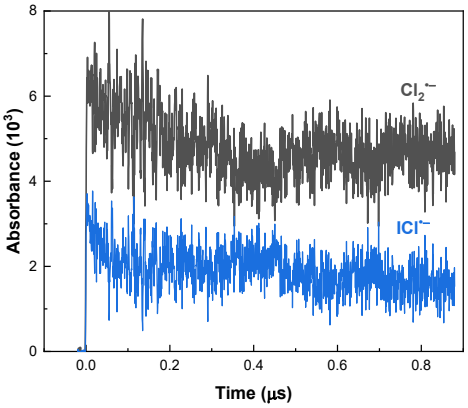

Fig. S4. Deconvoluted kinetic traces after electron pulse irradiation of 10 wt.% KI in LiCl-KCl eutectic with 2 wt.% $ZnCl_2$ at 400 °C.

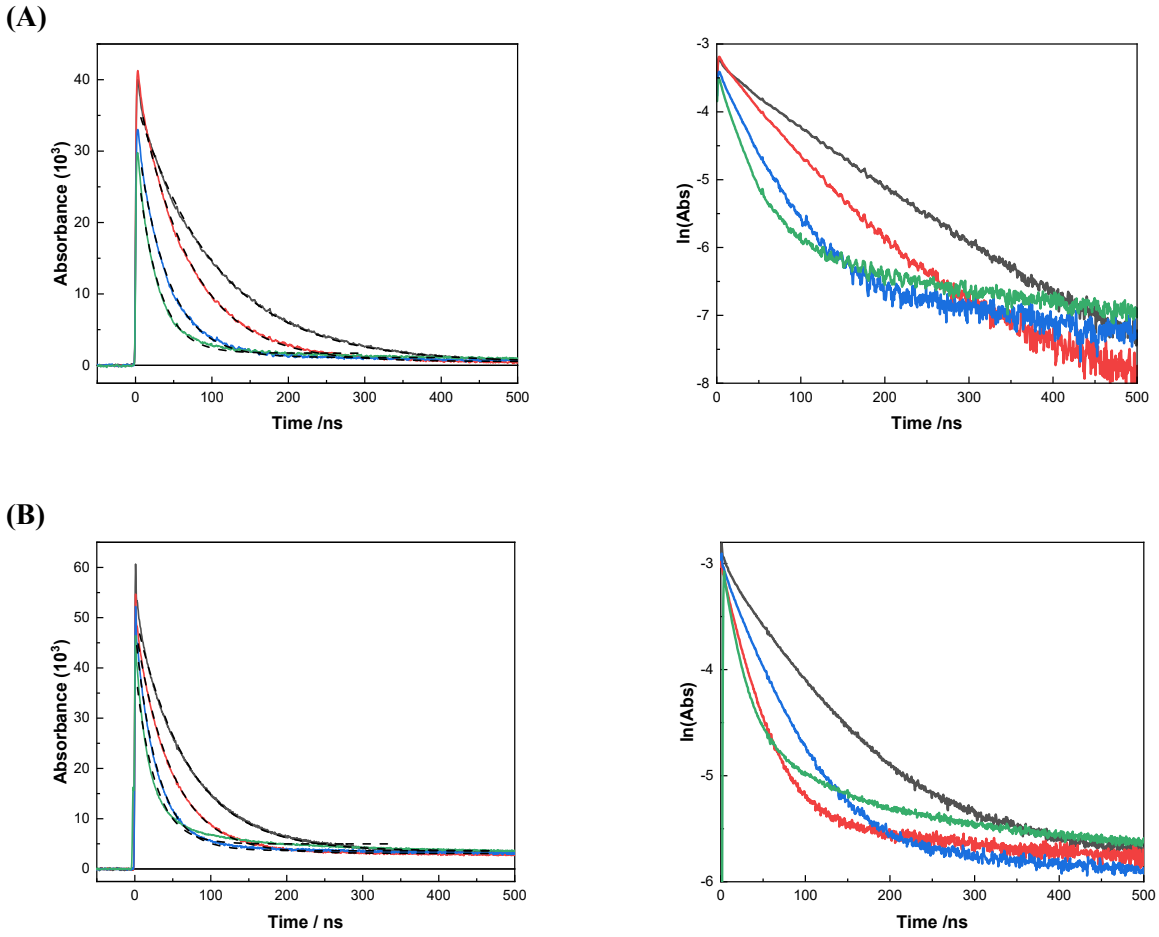

Fig. S5. Dose corrected absorbances at 671 nm and the natural logarithm of those absorbances as a function of time from 0–500 ns demonstrating the decay of the e_s^- after the electron pulse irradiation of **(A)** LiCl-KCl eutectic and **(B)** 9.998 wt.% KI in LiCl-KCl eutectic at 400 (—), 500 (—), 600 (—), and 700 (—) °C.

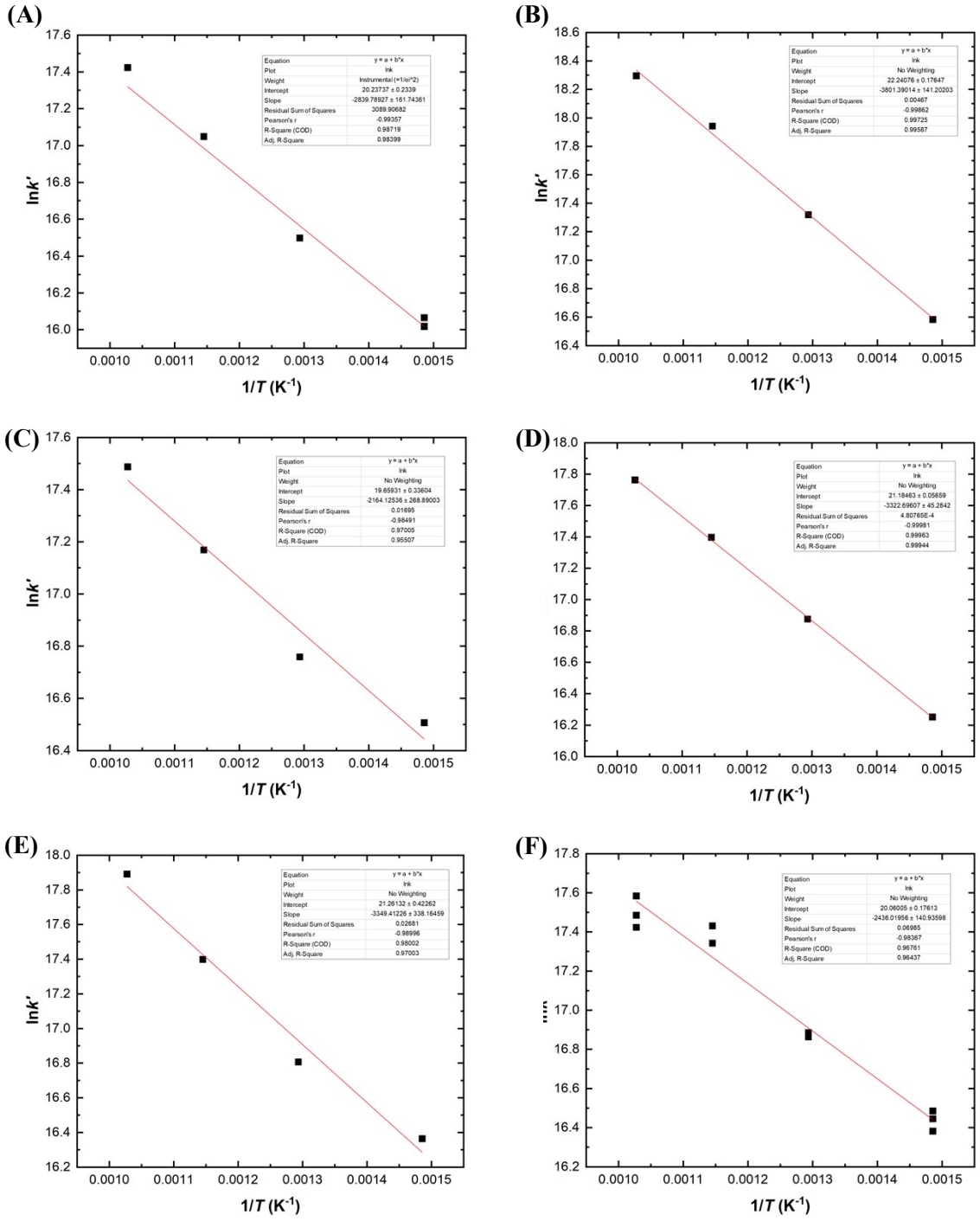

Fig. S6. Plot of the natural logarithm of the pseudo-first-order fits to solvated electron decay *vs.* the inverse temperature for 0.000 **(A)**, 0.107 **(B)**, 0.536 **(C)**, 1.072 **(D)**, 5.107 **(E)**, and 9.998 **(F)** wt.% KI in LiCl-KCl molten eutectic.

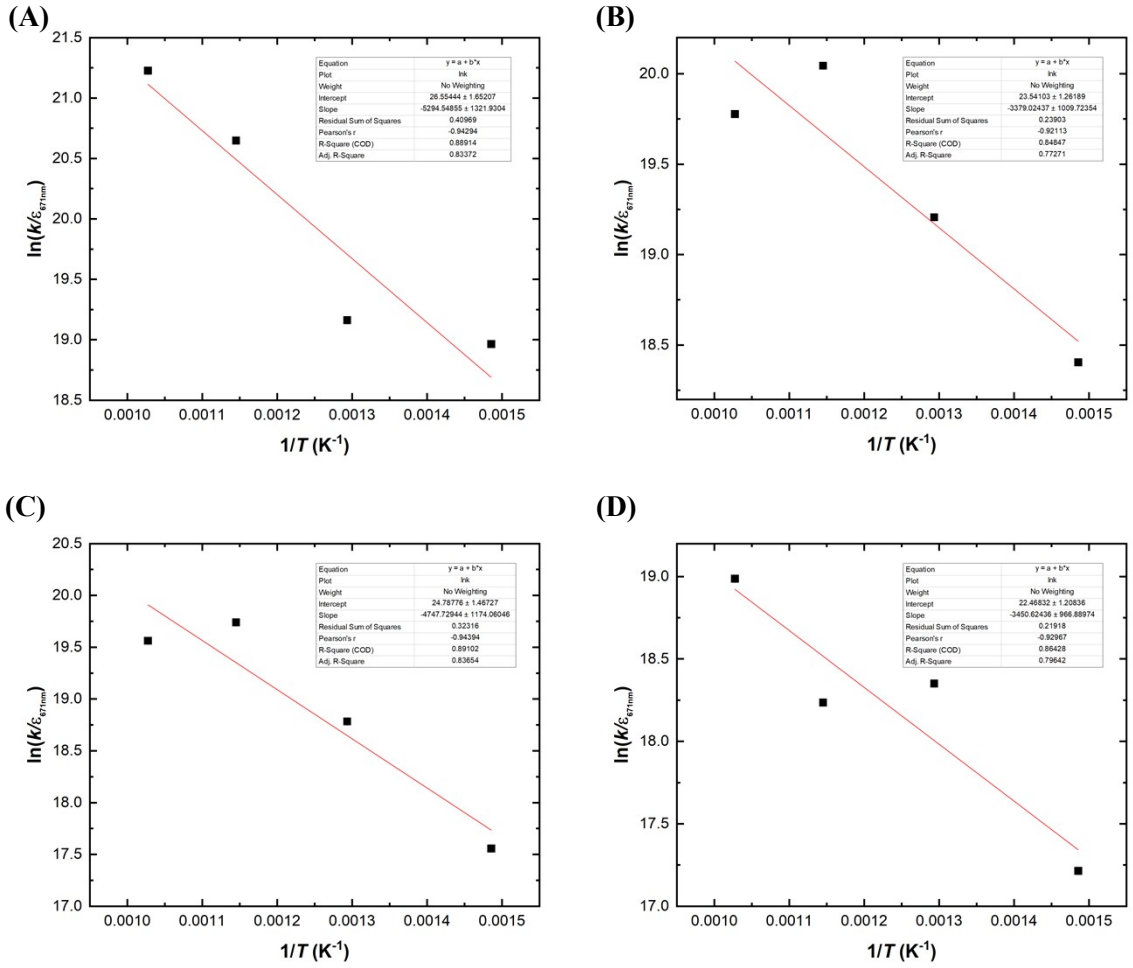

Fig. S7. Plot of the natural logarithm of the fitted k/ε_{671nm} for the $ICl^{\bullet-}$ radical cation decay *vs.* the inverse temperature for 0.107 **(A)**, 0.536 **(B)**, 1.072 **(C)**, and 5.107 **(D)** wt.% KI in LiCl-KCl molten eutectic.

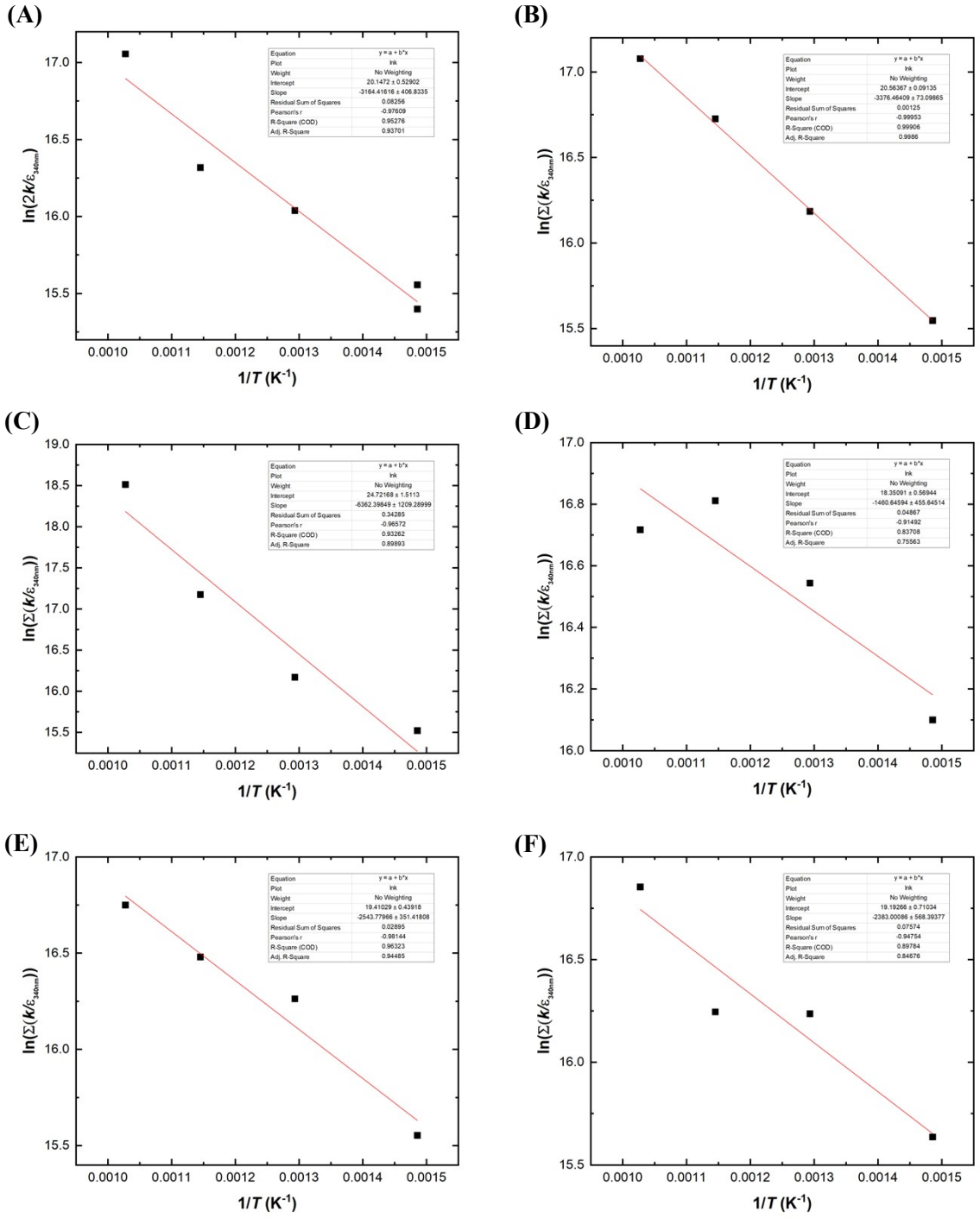

Fig. S8. Arrhenius plots for the overall second-order fits of the combined $Cl_2^{\bullet-}$ and $ICl^{\bullet-}$ radical decay *vs.* the inverse temperature for 0.000 **(A)**, 0.054 **(B)**, 0.107 **(C)**, 0.536 **(D)**, 1.072 **(E)**, and 5.107 **(F)** wt.% KI in LiCl-KCl eutectic at 340 nm.

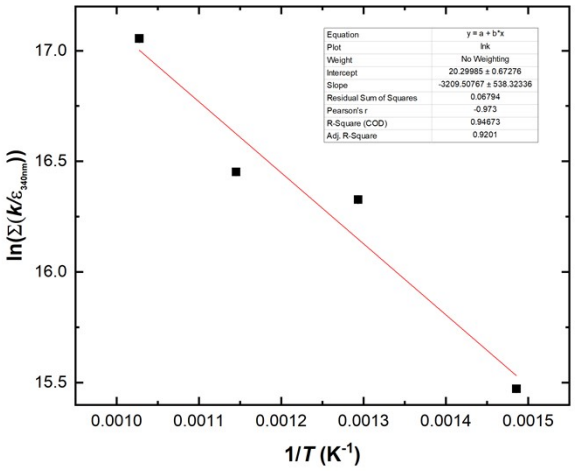

Fig. S9. Arrhenius plots for the overall second-order fits of the combined $Cl_2^{\bullet-}$ and $ICl^{\bullet-}$ radical decay *vs* the inverse temperature for 5.107 wt.% KI in LiCl-KCl eutectic at 400 nm.

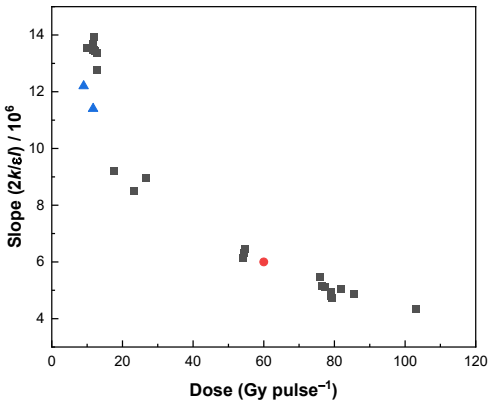

Fig. S10. $Cl_2^{\bullet-}$ radical anion decay rate ($2k/\varepsilon l$) *vs.* the dose per pulse after the electron pulse irradiation of neat LiCl-KCl eutectic from: this work (□), Iwamatsu *et al.* (■), and Hagiwara *et al*. (●).

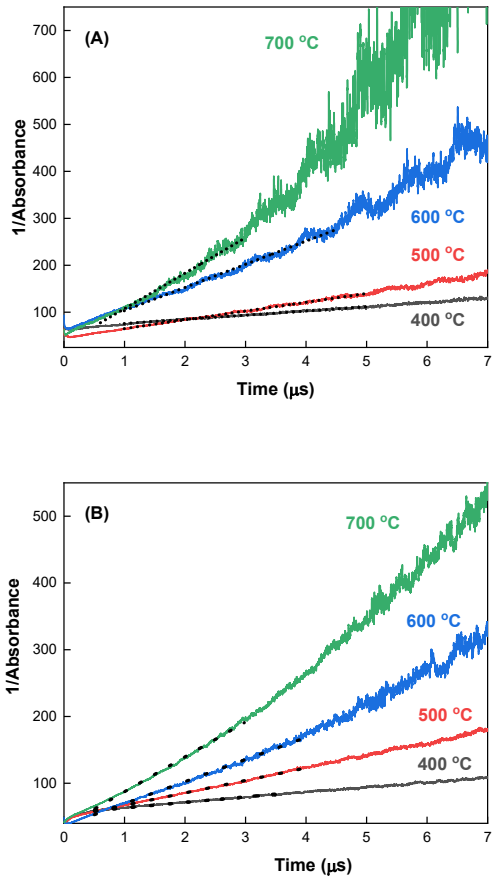

Fig. S11. The fitted inverse absorbance at 340 nm **(A)** and 400 nm **(B)** after the electron pulse irradiation of 10 wt.% KI in LiCl-KCl eutectic at 400 (—), 500 (—), 600 (—), and 700 (—) °C.

Table S1. Fitted pseudo-first-order rate coefficients for the decay of the solvated electron at 671 nm.

[KI] (wt.%)	**Pseudo-first-order rate coefficients for the e_S^- decay at 671 nm (k' / 10^7 s^{-1})**			
	400 °C	**500 °C**	**600 °C**	**700 °C**
0.000	0.909 ± 0.001	1.462 ± 0.002	2.536 ± 0.007	3.69 ± 0.02
0.054	1.287 ± 0.003	2.518 ± 0.006	4.30 ± 0.02	6.08 ± 0.07
0.107	1.591 ± 0.003	3.32 ± 0.01	6.20 ± 0.03	8.8 ± 0.1
0.536	1.474 ± 0.003	1.898 ± 0.004	2.859 ± 0.009	3.93 ± 0.03
1.072	1.142 ± 0.002	2.134 ± 0.004	3.59 ± 0.01	5.18 ± 0.05
5.107	1.278 ± 0.003	1.992 ± 0.005	3.60 ± 0.01	5.89 ± 0.05
9.998	1.097 ± 0.002	2.111 ± 0.006	3.71 ± 0.02	5.35 ± 0.06