Electronic Supplementary Information

Modelling and analyzing the glass-like heat transfer behavior of

rare-earth doped alkaline earth fluoride crystals

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Here, more experiment data of thermal conductivity in RE doped calcium fluoride systems are presented.

1 Characterization of heat transfer performance in RE doped calcium fluoride





Fig. S1 Temperature dependence of thermal conductivity in RE doped CaF₂ single crystal. (a) La:CaF₂; (b) Ce:CaF₂; (c) Pr:CaF₂^[1].

As shown in Fig. S1, the thermal conductivity curves of La:CaF₂, Ce:CaF₂, and Pr:CaF₂ present the similar abnormal heat transfer behavior as described in the manuscript (The **Part 2**). With the increasing concentration of RE ions, the thermal conductivity changes continuously from a crystalline state to the glass-like state.



Fig. S2 Temperature dependence of thermal conductivity in Er:CaF₂ system.

As shown in Fig. S2, the thermal conductivity data of CaF_2 crystal doped with Er^{3+} within 200 - 400 K is employed to calculate the parameters in the Gaume model at a low doping concentration.

Popov P. A., Fedorov P. P., Konyushkin V. A. Heat Conductivity of Ca_{1-x}R_(x)F_{2+x} (R = La, Ce, or Pr; 0 <= x <= 0.25) Heterovalent Solid Solutions [J]. Crystallography Reports, 2015, 60(5): 744-8.