**Numerical study of thermal shock damage mechanism of polycrystalline ceramics**

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**Fig. S1** The final crack patterns of different grain size models.

**Fig. S2** Schematic of total failure of the RVE models with different grain boundary fracture energies.

 **Fig. S1** shows the final crack patterns of different grain size model. Due to the convergence problem of multiple cracks growth, the step time of final crack patterns is less than 1 s.



**Fig. S1** The final crack patterns of different grain size models.

**Fig. S2** shows the total failure of the RVE models with different grain boundary energies. When the grain boundary fracture energy increases to 5.2 J/m2. The fracture mode changes from intergranular fracture to transgranular fracture.



**Fig. S1** Schematic of total failure of the RVE models with different grain boundary fracture energies.

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