Thermal Field Design of Resistance Heated SiC Crystal Growth Furnace by Solution growth

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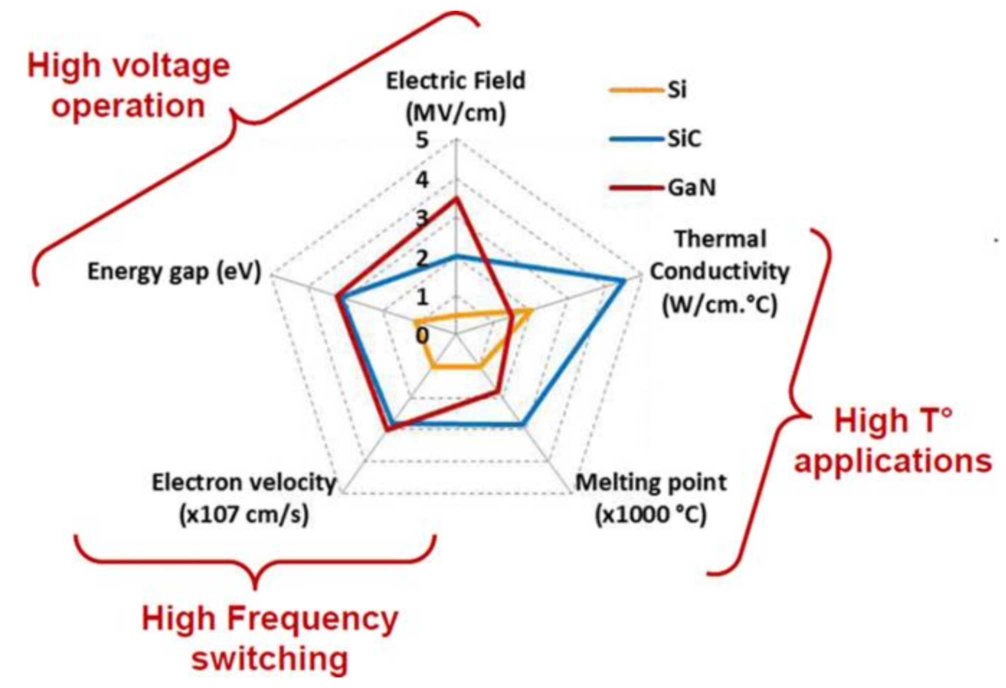
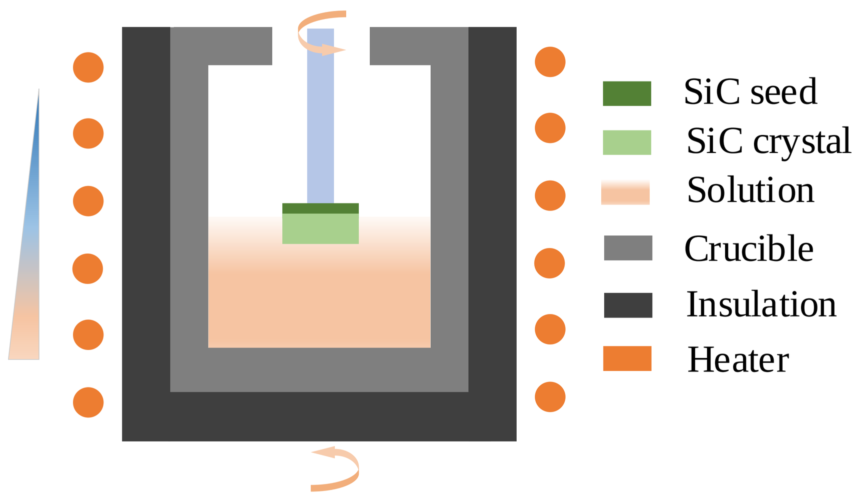
Motivation

Silicon carbide (SiC) has major applications



[1]Roussel P, International SiC Power Electronics Applications Workshop, Sweden, **2011**



The solution growth method can yield SiC crystals with low dislocation density

Compared with RF heating, resistance heating can achieve desirable thermal fields for larger SiC bulk crystal growth[2]

Design of resistance heated SiC crystal growth furnace for better crystal quality

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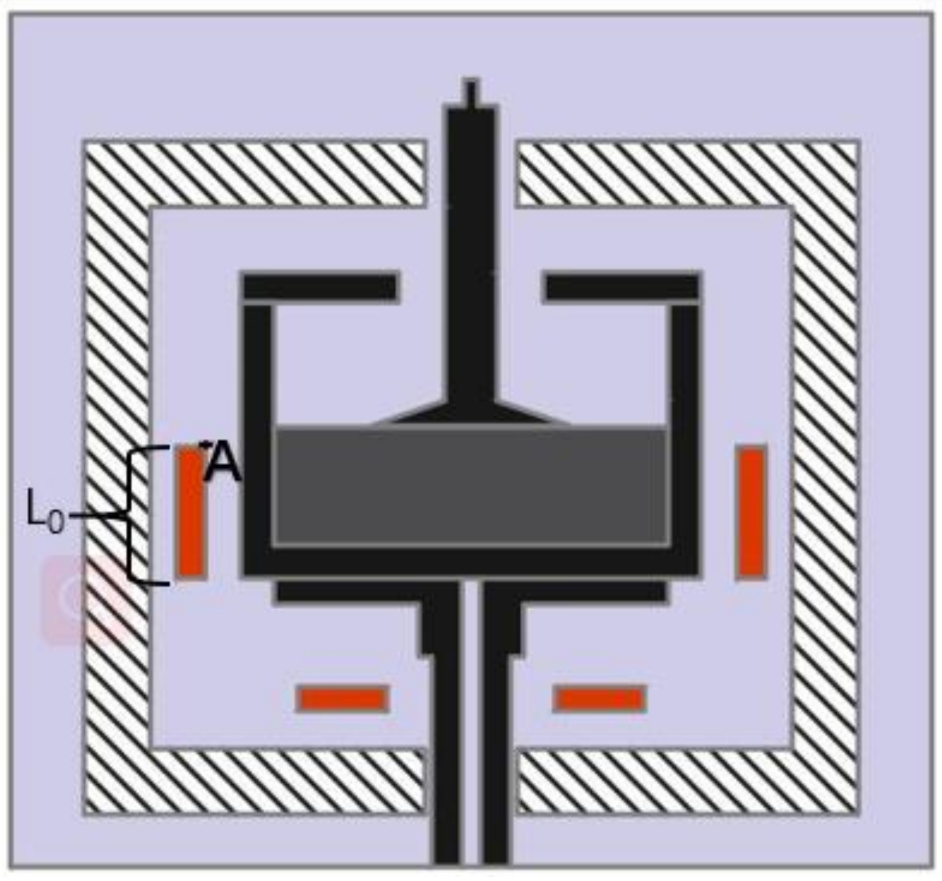
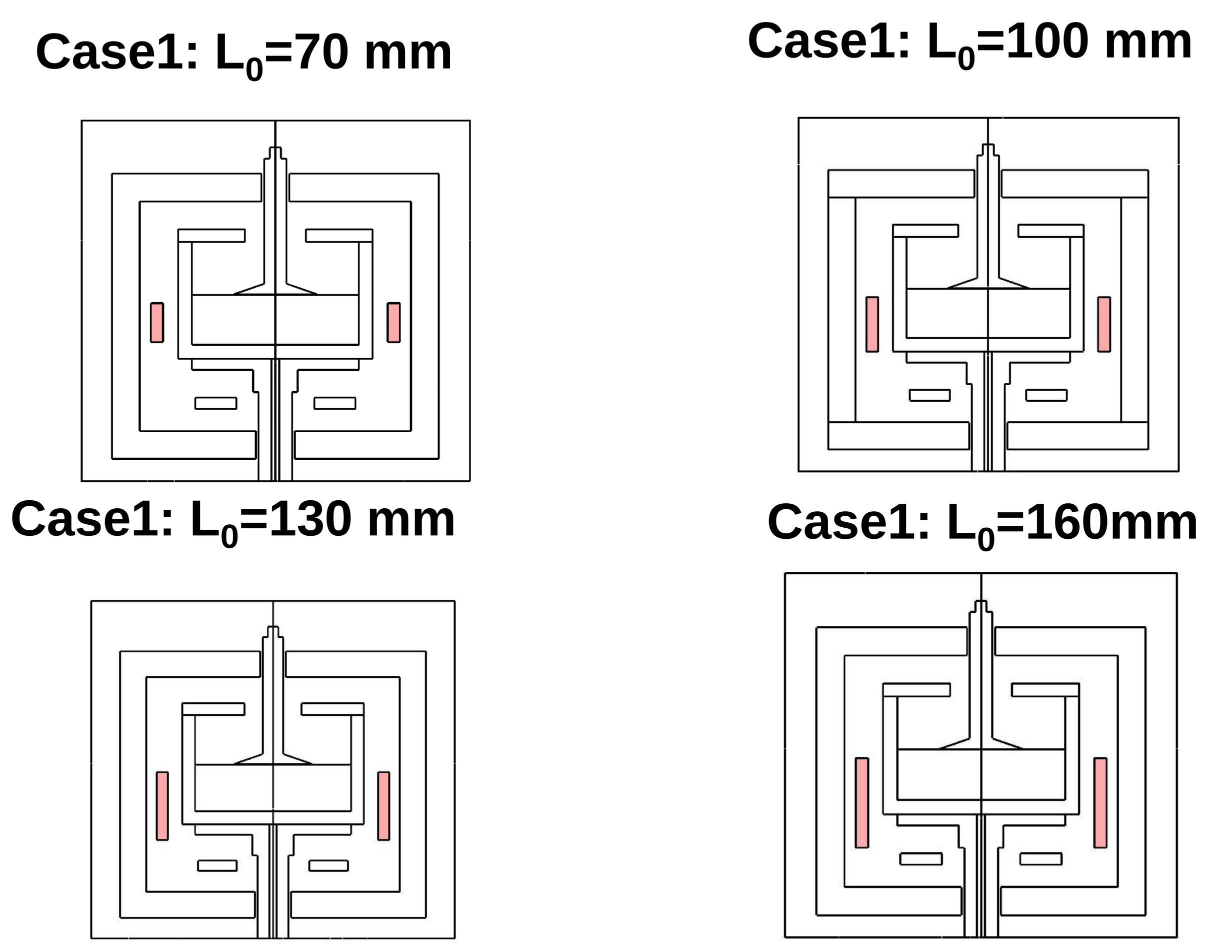
Numerical Model

Large SiC single crystal growth system with resistance heating

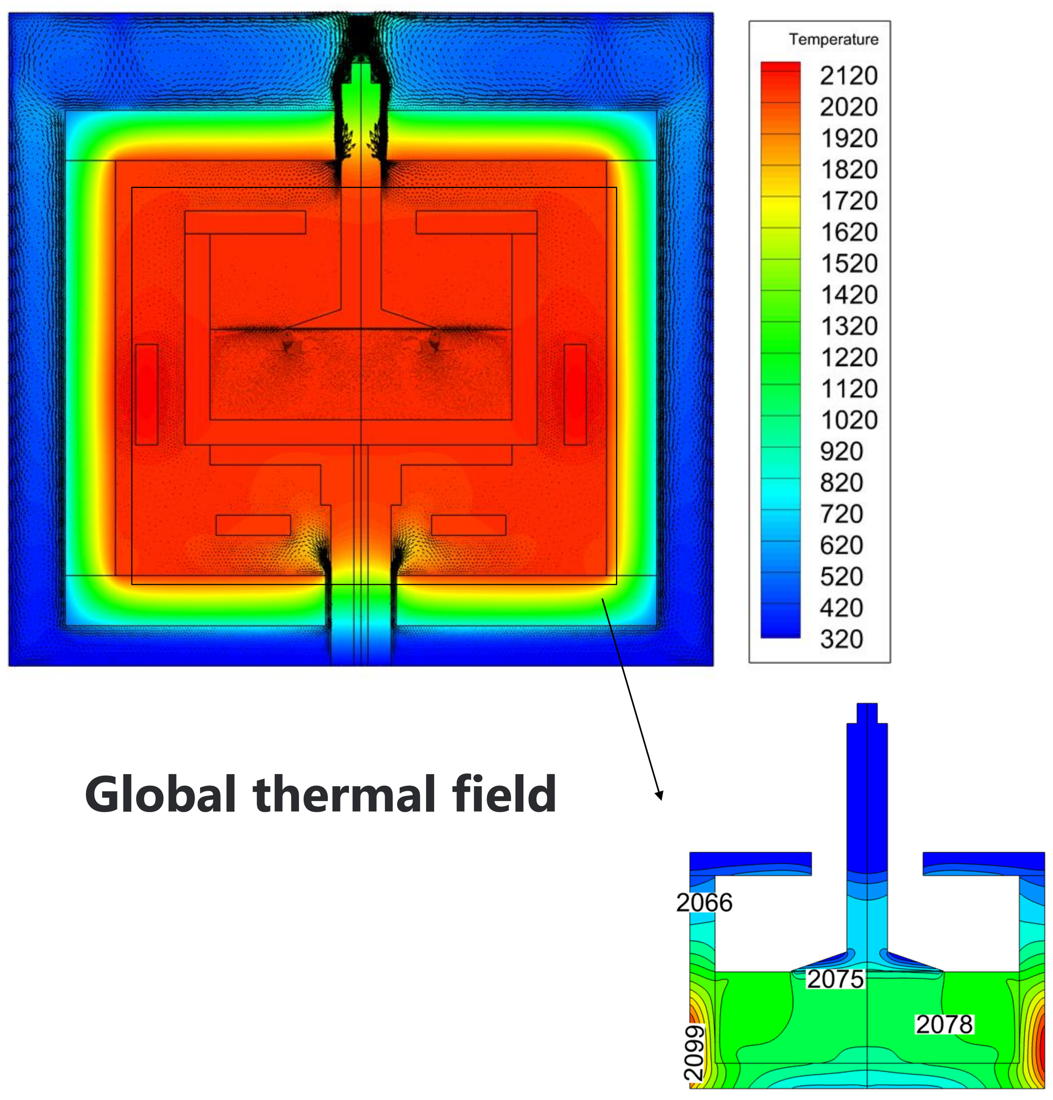


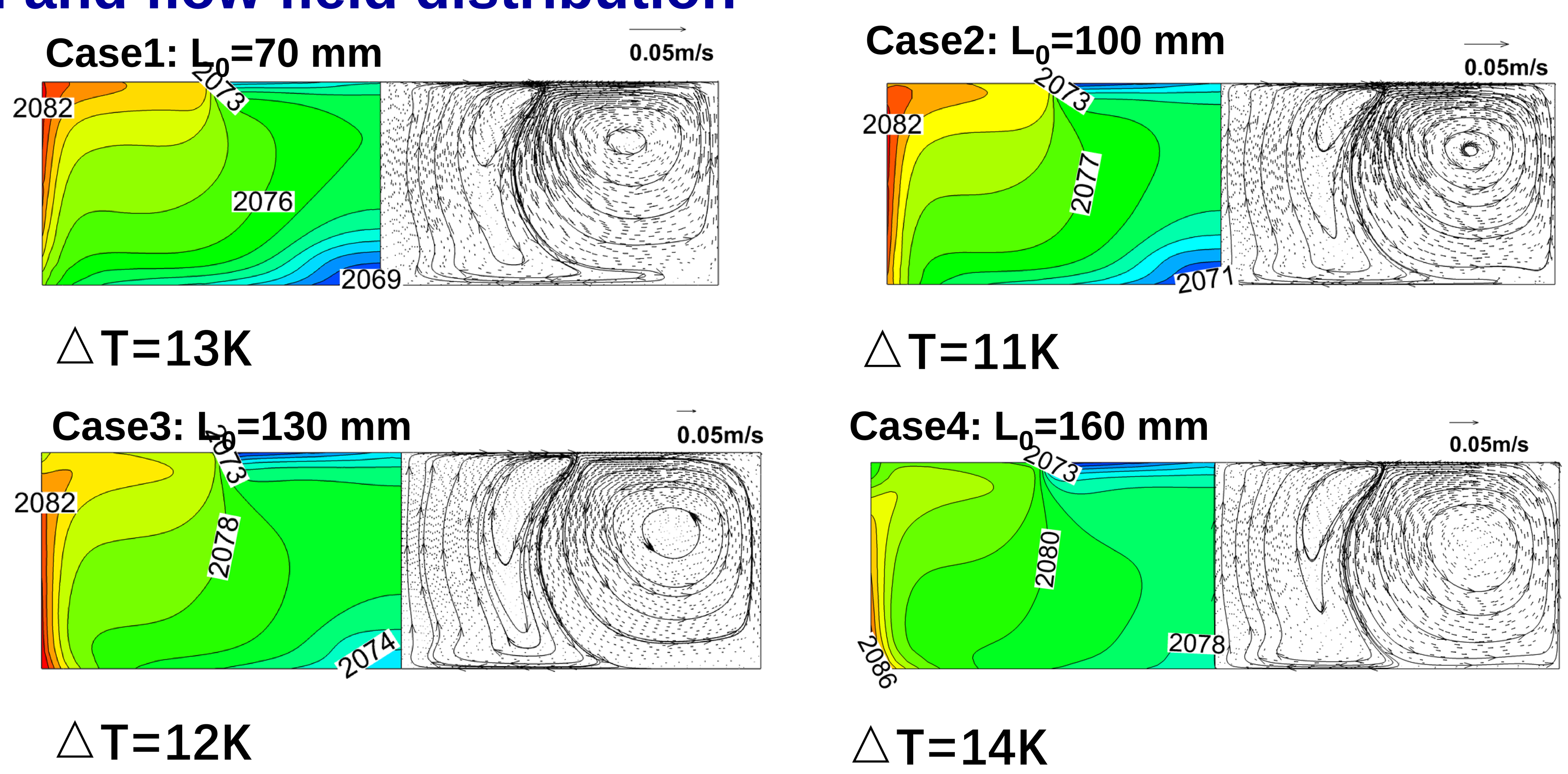
furnace parameter	
Seed crystals	6 inch
Solvent radius	300 mm
Solvent height	90 mm
Heater thickness	20 mm
Side heater length	100 mm
Bottom heater length	74 mm
Crucible height	210 mm
Crucible thickness	25 mm



Results and discussion

Effects of heater length on thermal and flow field distribution





The fluid flow mainly driven by buoyancy conveciton, forced convection and Marangoni convection.

Conclusions

- **With the increase of heater length，The temperature difference inside the melt first decreases and then increases.**
- **With the increase of melt temperature difference, buoyancy convection becomes stronger, and the flow inside the melt is dominated by thermal buoyancy.**