Ceramic Containment Materials for High Temperature Concentrated Solar Power (CSP)

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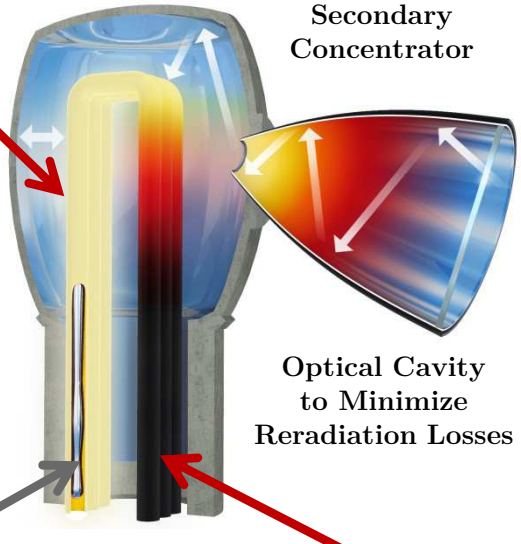
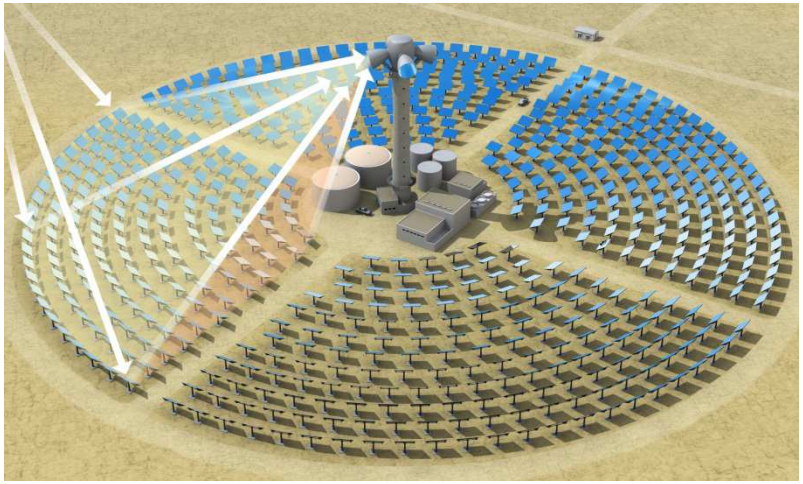
Higher Temperature → Higher Efficiency → Lower Cost

565°C → 1500°C



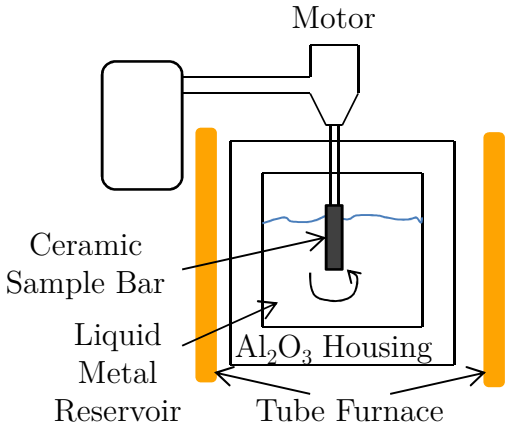


Liquid Metal Working Fluid
Tin [232°C - 2602°C]
Aluminum [660°C - 2519°C]

Corrosion Properties Not Well Understood

High κ Ceramic Pipes

High Temperature κ For Carbides Not Well Understood



Materials of Interest

Low Thermal Conductivity	High Thermal Conductivity	
Al_2O_3	AlN	WC
MgO	Si_3N_4	ZrC
ZrO_2	SiC	TiC
CaO		

First Principles (DFT) Molecular Dynamics

$$\kappa_e = \frac{2LTe^2}{3m} E_F \cdot D_F \cdot \tau_F$$