

Calculation Analysis and Preparation Optimization of Silver Powder Sintered Heat Exchangers at Extremely Low Temperature

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Due to the Kapitza resistivity, a sharp deterioration of heat transfer occurs between solid and liquid in the heat exchanger of the dilution refrigerator at extremely low temperature. It is necessary to use silver powder sintered heat exchangers to optimize the interface heat transfer. A theoretical calculation of heat exchangers at extremely low temperatures was carried to analyze the influence of the Kapitza resistivity on heat transfer performance. Silver powders with different particle sizes of 50nm, 200nm and 500nm were selected for the preparation of sinters. Their micro-scale sintering conditions, porosity, thermal conductivity and specific surface area were carefully presented. Combining theoretical calculations with experimental results, the performance of the sintered heat exchangers at extremely low temperatures could be optimized.