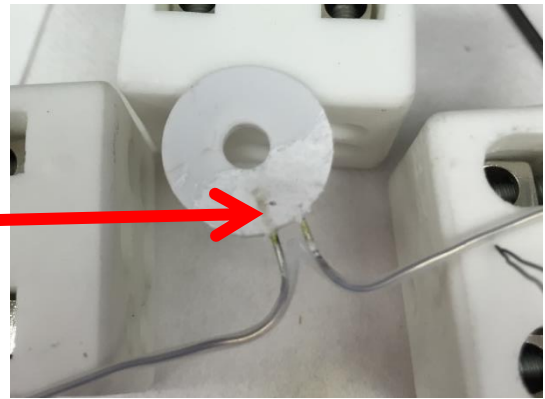
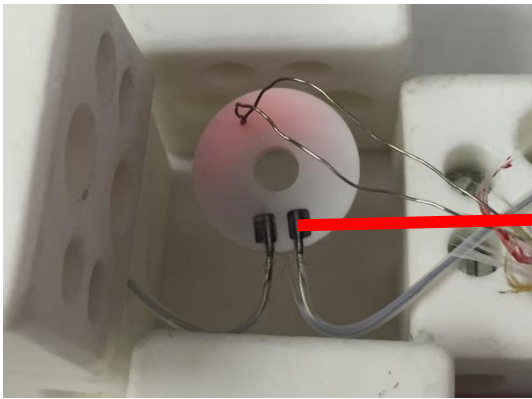
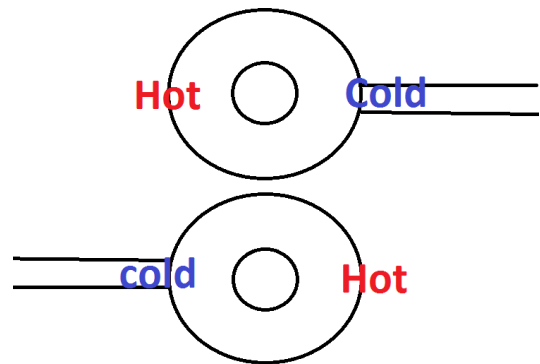
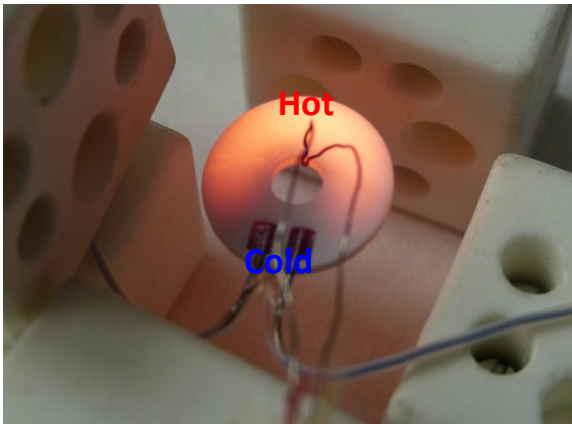


## Procedures for using the W-Al<sub>2</sub>O<sub>3</sub> Ceramic heater:

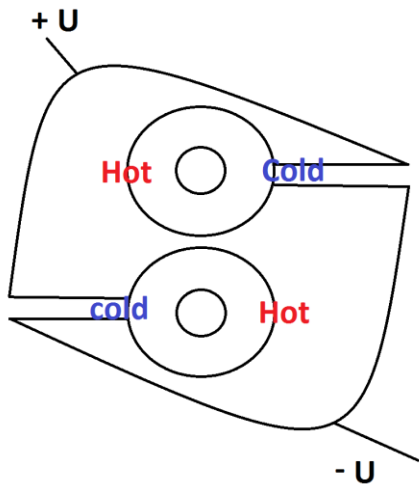
1. Fill in ceramics near the connection wire:



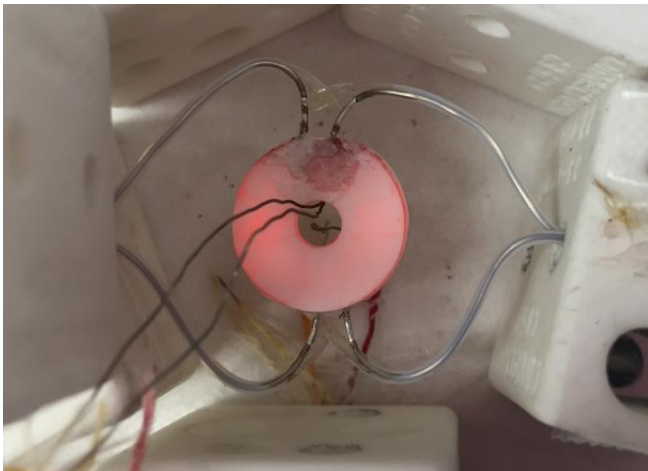
2. To balance the uneven temperature of single heater, stack 2 heaters 180 degrees offset from each other and glue them with zirconia ceramics:



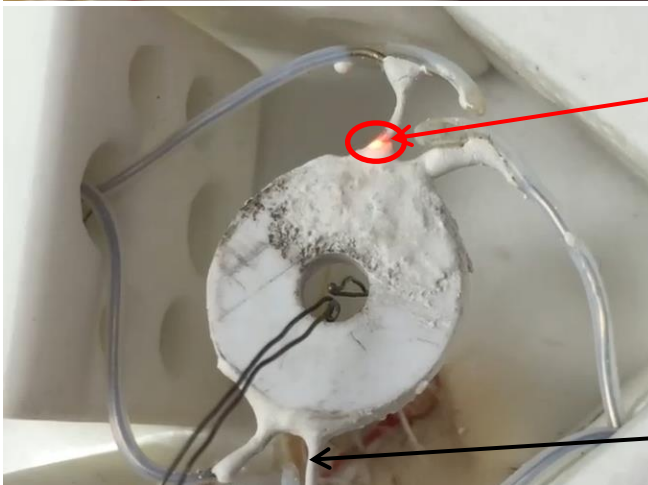
3. Connect the end wires forming a parallel circuit



4. Add voltage to the heater, notice the relatively even heating of the heater, limit of the voltage is about **18 V**, current is about **2.2 A**, connection wires break first.



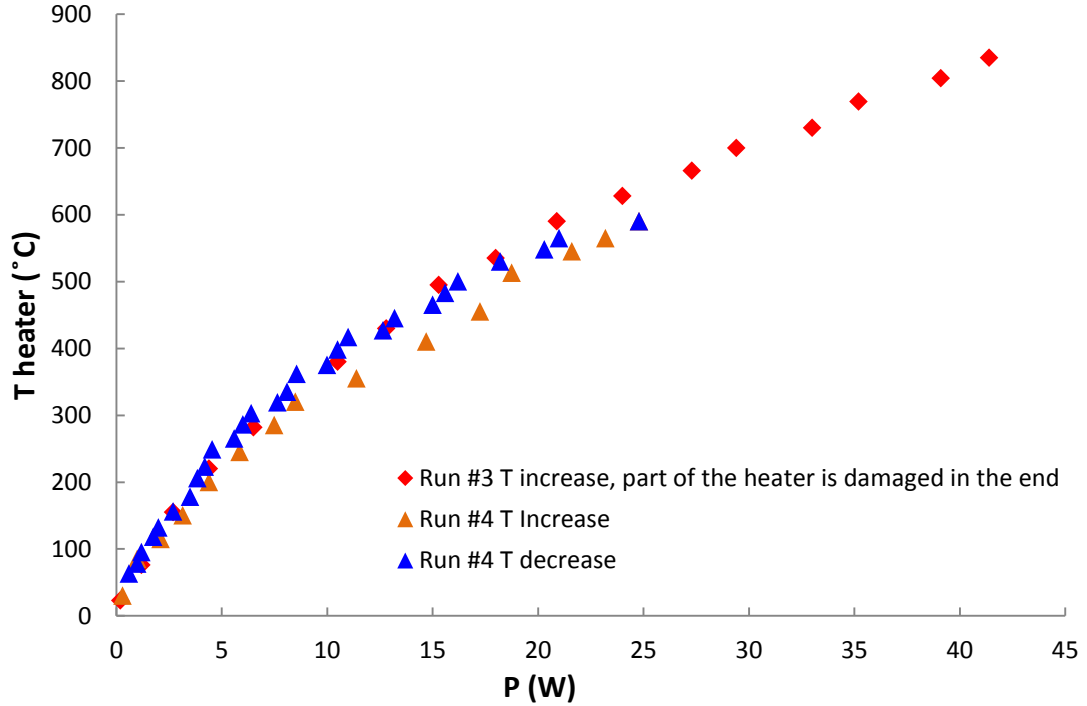
Ensure the connection of the wires by checking the total resistance:  $\sim 3-5 \Omega$  for the stacked heaters



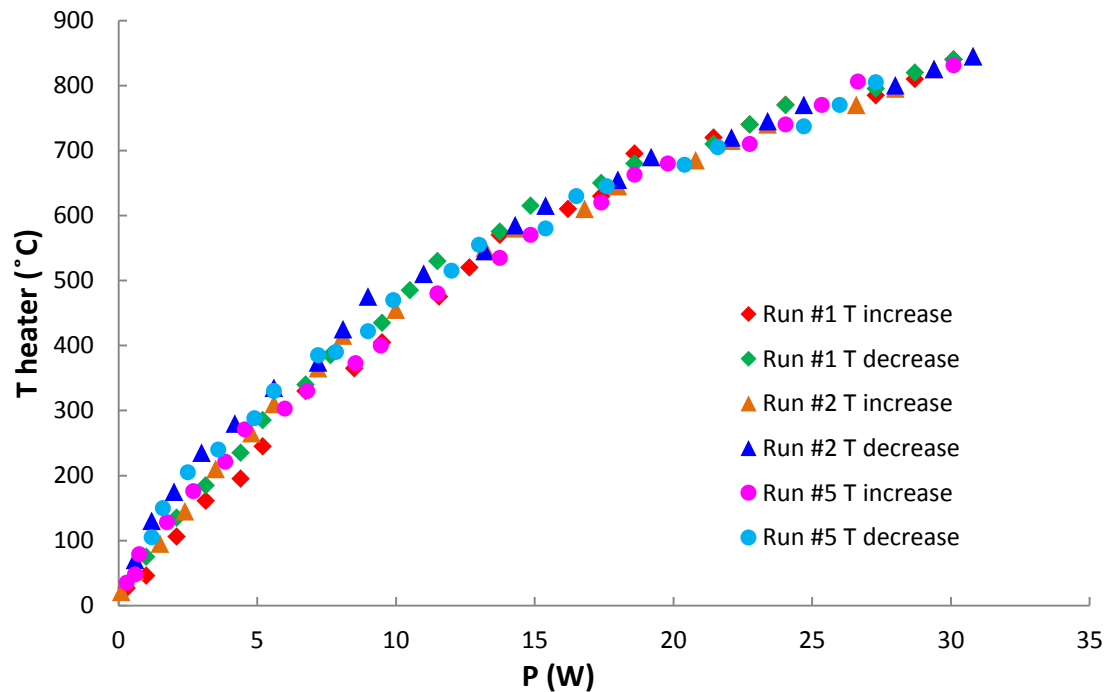
Sparkling of the connection wire is an indication of failing wire.

Adding ceramics to cover the connection wires is helpful.

5. Power curve temperature is measured through k type thermal couple, position in the inner wall of the heater. Power supply: Sorensen XHR33-33 (0-33V 0-33A). Note: **T is heater temperature**.
- For the stacked heater: After Run #3, part of the heater was broken, therefore run #4 is for the broken heater.



- For the single heater: Heater is still good after several cycles.



6. Power curve temperature is measured through k type thermal couple. Heater is with inner diameter 6mm.
- a. Single heater broke at 175 °C, 450K. Temperature measured on diamond inside BX90 DAC in real high pressure experiment.

