Safety Precautions:
Please make sure all the equipment is in safe condition before and after conducting the experiment.

Objectives:

1. To determine the critical heat flux of oxidized sample.

Introduction:

CHF is an important criterion in nuclear reactor safety and the efficiency of boiling heat transfer. This parameter is known to be dependent on the surface roughness and the wettability of a material that is in contact with the boiling fluid. Generally, CHF increases with increasing surface roughness and wettability. However, the individual effect of each factor is not yet well understood. One way of increasing the surface roughness is by sanding followed by oxidizing the surface of the specimen. The results can thus be compared to that of Experiment 2.

The oxidized specimen used in this experiment is prepared by sanding down the sample with sandpaper, which in this case is 320 ultrafine grade sandpaper. After sanding, the sample is put inside the furnace until it reaches 300°C, with a heating rate of 2-2.5°C/min. The sample is then maintained at this temperature for 10 minutes before being cooled down to 30°C with rate of 2-3°C/min.

Direct Joule heating method is used. This method easily supplies steady state heat flux and exhibits fast thermal response. Applied heat flux can be calculated using the Joule's heat flux equation, Equation 2.1

$$q'' = \frac{\text{Power}}{\text{Heated Area}} = \frac{VI}{WL} \tag{2.1}$$

where, V is the measured voltage drop across the test material, I is the measured current, W is the width of the heat transfer area, and L is the heated length. Uncertainty of the measured heat flux is estimated at 5.2% based on the propagation of error method.

Deliverables

Your report should include the background description of the experiment, objectives, procedures, data collected, results calculated, discussions and conclusion. Hand in your work in a zip file containing all relevant files.