11. Pool Boiling Setup

- Purpose: This setup is designed to investigate pool boiling behaviors on plain or structured surfaces with a maximum input power of 5 kW. Bubble dynamic evolution behaviors is visualized in situ with the aid of a variable magnification endoscope to clarify pool boiling heat transfer enhancement mechanisms on structured surface. The size of heated area can optionally be either 1cm x 1cm or 1in. x 1in.
- Imaging: High speed camera (Photron Mini AX 200), high-magnification zoom lens (InfiniProbe TS-160) and high temperature resistant magnification endoscope ()
- Data acquisition: National Instruments DAQ systems
- Heaters: five cartridge heaters with a total power of 5 kW for heating samples and four immersion heaters with a total power of 2 kW for heating coolant.
- Power supply: Variac transformer (5000VA, 0-250V) and a power meter.
- Coolant temperature control system: PID controller, RTD, and four immersion heaters
- Operation: Before each experiment, the coolant in the pool boiling chamber is degassed for 30 min to expel any dissolved non-condensable gases. After this procedure, the coolant temperature is adjusted to the required temperature by feedback system. Then the input power to the target surface is incrementally increased and measurements are taken after the temperatures reached a steady state (that is, when the temperature variation was <0.05 ºC over a period of 120 s). The thermocouple readings are averaged over a period of 30 s.