Pool Boiling System Introduction

- Study the mechanism of pool boiling. Especially on the effect of bubble confinement achieved by placing a perforated flat plate over the heated surface.
- Use Engineered Fluid HFE-7100 (3M™ Novec™) as the working fluid.
- A thin film of Indium-Tin-Oxide (ITO) was deposited on a silicon substrate which was heating element. The dimension of the substrate was 17 X 12 mm² which is large enough to avoid the effect of heater size.
- Manipulate the IR camera and high speed camera to acquire the surface thermal conditions and the motion of bubbles.
- Control the plate hole size and the gap distance to confine the heat transfer performance.
The infrared camera is used to acquire the temperature distribution. It has a spatial resolution of about 25 μm per pixel and the frame capture rate was set to 100 Hz. The software ExaminIR was used to record the temperature distribution video.
The high speed camera (FASTCAM SA3, Photron) with a high resolution lens (Zoom 6000 series, Navita) was used to capture the high speed video of the bubble motion. The maximum resolution of the high speed camera was set to 1024X1024 pixels when the frame rate was set at 1000 Hz.

The chiller (NESLAB Merlin M25, Thermo Scientific) was connected to the condenser tube to control the temperature of condenser. The temperature range of the chiller was able to set between -15°C and 35°C.