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[Invited] Heat transfer during bubble shrinking in saturated He II under microgravity condition

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Microgravity experiments of He II boiling using a drop tower were carried out. The small cryostat equipped with optical windows and whole the equipment was dropped more than 100 times. Time duration of microgravity environment less than 1 m-g is about 1.2 sec. The process of bubble shrinking in He II in microgravity was observed by a high speed camera with a telecentric lens under the illumination of an LED light. First, large spherical bubble of about 10 mm was created by a short wire heater (Diameter 0.05 x Length 2.2 mm) for a heating time of 0.4 sec. And then the bubble shrinking was visualized after the heater switched off. The time variation of volume of bubble is estimated by image analysis. The shrinking speed of bubble was calculated from the time variation data. Shrinking speed must be subject to the heat flux across liquid-vapor interface. The calculation result of heat flux across the interface in terms of the latent heat and vapor density of saturated He II is roughly in agreement with the kinetic theory that takes into account of the effect of mass flux caused by vapor-liquid interface motion. It is found that the heat flux across the interface in microgravity is dominantly determined by the pressure difference due to surface tension.

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