

**OP 281**

## Development of a High-magnification In-situ Observation System for Welding Solidification Phenomena

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In welding solidification, the liquid film remains between the solid phase in the solid-liquid coexisting region. The morphology of the residual liquid film in the solid-liquid coexisting region is considered to affect the susceptibility to solidification cracking because solidification cracking occurs due to localized shrinkage strain in the residual liquid film. Therefore, it is important to observe the residual state of the liquid film during solidification in detail to elucidate the phenomenon of solidification cracking occurrence. In this study, the high-magnification in-situ observation system was developed by combining an optical microscope and a high-speed camera. This system enables continuous, high-magnification, high-resolution observation of welding solidification phenomena by attaching the objective lens of a microscope to a high-speed camera. By using this system, the solidification phenomena in laser welding of stainless 310S was observed. The comparison with a high-magnification image and Sn quenched microstructure showed that residual state of liquid phase during solidification could be observed in detail and dynamically.