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# Improved temperature measurement with thermal imagers

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Accuracy of radiation thermometry by thermal imagers depends on several aspects. One is the traceability to national primary standards. In Japan, traceability for thermal imagers have been established as a part of the radiation thermometry traceability system, which is unique in that the primary references are fixed-point blackbodies of the defining fixed points of the ITS-90 above 156 ℃. However, there are other traceability routes, such as those to contact thermometers, or to accredited schemes overseas. It is of interest to know how well these agree with each other. Therefore, a comparison among Japanese calibration labs and users is currently been conducted to verify the agreement among these various traceability schemes. In this talk, a brief overview of the Japanese traceability system is given, followed by a description of the comparison.

Another important aspect is the unknown emissivity. Like all radiation thermometry, unknown emissivity is a major obstacle when applying to practical temperature measurement. For non-blackbodies, not only does the object shows lower radiance, but also when measuring objects around or below room temperature, ambient reflection effect plays a critical role. Finally, size-of-source effect (SSE) is another major problem. This is especially true for thermal imagers, which generally show relatively poor imaging quality. Effect of the object emissivity and the instrument SSE in the obtained thermal images will be demonstrated. A method for mitigating these effects simultaneously is under development at the National Metrology Institute of Japan (NMIJ). This approach utilizes an auxiliary thermal source whose reflected image is transposed on to the thermal image from the measurement object. The principle, measurement set-up, and experimental results will be reported.