

Development of High Speed Laser Flash Systems to Measure Thermophysical Properties of Thin Films

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Reliable thermophysical property data values of thin films are important because of their use in developing advanced industrial technologies, such as highly-integrated electric devices, optical disks, magneto-optical disks, and thermoelectric devices. In order to meet this reliability requirement, the National Metrology Institute of Japan of the National Institute of Advanced Industrial Science and Technology (NMIJ/AIST) has developed thermorefectance methods by picosecond and nanosecond pulse heating using the same geometric configuration as the laser flash method. These light pulse heating methods display one-dimensional heat diffusion across well-defined breadths of the specimen. Thermal diffusivity values across thin films were measured with small uncertainties. Since the geometry is very simple, thermal diffusivity can be determined reliably, with uncertainty evaluation based on the Guide to the Expression of Uncertainty in Measurement (GUM).