

Development of Thermophysical Property Database for Thin Films in NMIJ/AIST

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In materials databases, the majority of accumulated material and thermophysical property data are for bulk materials. On the other hand, none of them usually store thermophysical property data of thin films systematically. A network database system for thermophysical property data has been developed by the National Metrology Institute of Japan (NMIJ), for bulk material. In general, the provision of thermophysical property data for thin film has two major difficulties. One is the difference between thermophysical property data of specimens and that of films in devices, and the other is the difficulty of measurement caused from complexity of layout of measurement specimens. In order to store and to provide the comprehensive information for thermophysical property data of thin films, NMIJ updated the database system for thermophysical property data. For exact identification of a thin film in the database, the approach that raw specimens are kept and permanently linked to the material information in the database was adopted. The criteria of material classification were updated to manage the material information, process information, and the thermophysical property data of the thin film specimens systematically. For example, when a thin film specimen is measured by an ultrafast laser flash method, the database stores not only an analyzed result but also various stages of the measured data such as the raw signal data. The database system is updated to store the spectrum data, such as Rutherford back scattering data and X-ray diffraction data, and these kinds of data come to be provided as possible. The updated database is demonstrated in terms of the storage of record items using a set of thermophysical property data of "TiN single layer thin film on synthesized quartz substrate" and Al₂O₃ coated with Mo three-layer thin films on fused silica substrate". These data are available free on following website:
http://riodb.ibase.aist.go.jp/TPDB/DBGVsupport/index_en.html