

Time-Domain Thermoreflectance

Time-domain thermoreflectance (TDTR) is one of the most powerful methods to measure the thermal properties, most importantly thermal conductivity, of a wide range of bulk and thin film materials and their interface. The principle is to take advantage of the change in the reflectance of the surface to derive the thermal properties when a material is heated up. The set-up includes a pump and probe pulsed-lasers. The pump laser is utilized to generate acoustic pulses. The acoustic pulses could be at a transmittance or reflectance state at an interface, depending upon the properties of the interface. The probe laser will detect the reflecting acoustic pulses through a photodetector. Thus, the reflectivity can be measured with respect to time, and thermal properties can be extracted by matching theoretical models. Temperature-dependent TDTR can be carried out with the help of cryostats to study the fundamental physics of the transport process of energy carriers, e.g., electrons and phonons.

Customer References:

Jun Liu, Department of Mechanical and Aerospace Engineering, North Carolina State University, USA: [AIP Advances 9, 115116 \(2019\)](#).

Related Products:



X-1AL ECONOMY

- Easy optical alignment
- All purpose
- Low cost



X-1SS HIGH PERFORMANCE

- Best for electrical, magnetic, and optical experiments



X-20 ULTRA-LOW VIBRATION

- Vibrations < 3-5 nm
- Quick and easy sample access via pop-off shroud
- High temperature stability

Cryostat Model	Type
DMX-1AL	CCR
FMX-1AL	CCR

Cryostat Model	Type
DMX-1SS	CCR
FMX-1SS	CCR
GMX-1SS	CCR
LT3-WMX-1SS	Flow

Cryostat Model	Type
CS202-DMX-20	CCR
CS204-DMX-20	CCR
CS210-GMX-20	CCR



-OM OPTICAL MICROSCOPY



LT4

- Ultra low vibrations (3-5 nm)
- Can achieve temp. up to 450 K

- All-purpose, low cost flow cryostat
- Maintains the high cooling power of the LT3
- UHV option available

Cryostat Model	Type
DMX-20-OM	CCR
GMX-20-OM	CCR
LT3-OM	Flow

Cryostat Model	Type
LT4	Flow