Calibration — Quick Start

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Calculates the thermoreflectance coefficient (TR) or emissivity (IR) of specific device surfaces. Accurate temperature readings depend on a coefficient obtained via calibration. Coefficient maps can be produced for point-by-point calibration. The module thermally cycles the DUT while reading the thermocouple back, continuously averaging coefficients across cycles to raise SNR.

Key features:

- **Camera Image Display** — grab, zoom (SHIFT-CLICK to zoom out), and area select tools.
- **Hardware** — Thermal Chuck Settings (current to TCAT-100 stage, changeable via Options in Project Manager); Microscope Settings (objective magnification, set in Project Manager).
- **Timing/Illumination** — Thermal Time Constant (hot-cycle duration); Image Averaging (#/cycle).
- **Brightness** — adjust for a bright-but-not-saturated image (saturation at 4095 units); Auto Brightness available; "Good Illumination" indicator turns green when illumination is sufficient for good SNR.
- **3D Alignment (TR only)** — Image Auto Alignment detects and corrects image shift during a run (reduces edge effects). Alignment Reference sub-controls: Focus ROI (region to track — pick an area easy to detect a shift in, e.g. a corner), Capture Reference (reference image to shift back to), Focus Tolerance (in-focus threshold on slope), Alignment % (increase to improve accuracy), Vibration Filter (decrease to improve accuracy).
- **Thermal Image Display** — main C^{tr} image; C^{tr} of all materials present is calculated and shown.
- **System Status / TCAT Image Parameters** — chosen measurement parameters, elapsed cycle time, heating/cooling status.
- **C^{tr} or Emissivity Graphs** — Camera Data (intensity, should not vary significantly during measurement, shows hot/cold-cycle transitions); Temperature (thermocouple readout, tracks hot/cold cycle); ROI History (C^{tr} history for a specific ROI, to check stability across cycles); ROI histogram (C^{tr} distribution across all pixels in the ROI, for consistency checking).
- **Area Statistics** — C^{tr}/Emissivity and associated data (incl. thermocouple temperature) for the selected ROI.
- **Save Image** — file name/path; comment text box shown when reopened in the Thermal Image Analyzer.

Verifying calibration using TCAT-100 in pulsed mode: set up a test sample as for calibration, launch Pulsed Mode software, select TCAT-100 as the output device, and enable thermocouple readback to simultaneously display the thermocouple signal alongside TR or IR measurement data. Calibrated IR camera results should closely overlap thermocouple results. Note: the thermocouple used with the TCAT module has a response time of ~0.5 s, so it may be necessary to lengthen the timescale to see an accurate response.

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