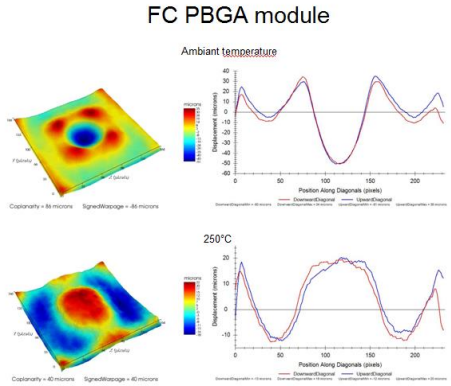
THERMOIRÉ: A VALUABLE INSTRUMENT FOR WARPAGE MEASUREMENTS

Analytical Services

The Akrometrix TherMoiré AXP is an instrument designed for measuring the topography of a solid sample surface, for an example, its deviation from a planar surface resulting from various temperatures. It uses a full-field, non-contact optical technique called shadow moiré in combination with automated image processing. Samples (up to 400 mm X 400 mm) are measured inside a computer-controlled oven chamber with a temperature ranging from ambient up to 300°C.

Measurements are obtained by positioning a grate (sheet of low expansion quartz glass engraved with equally spaced parallel lines) parallel to the sample. A beam of white light is then set at an angle of ~45° onto the glass, and the engraved lines on the glass produce a shadow on the top surface of the sample. When the sample surface is tilted or curved, a moiré pattern is formed by the geometric interference between the engraved lines on the glass and the shadow of those lines on the sample's surface. If the sample is flat and parallel to the grate, no warpage is involved and therefore no moiré pattern is formed. Image processing and analysis of the moiré pattern provides the sample's out-of-plane displacement. A technique, known as phase stepping, is applied to the shadow moiré to increase the measurement sensitivity of better than ± 2.5 µm.



This technique usually requires sample preparation. BGA removal, bake and application of a thin layer of high-heat white paint are recommended in order to obtain optimal results.

A Digital Image Correlation (DIC) system is also available to complement the TherMoiré. It is designed for measuring both in-plane and out-of-plane displacements of samples at different temperature.