UV Cure Dielectric/Conductivity Sensor and Quick Connect Fixture Specifications

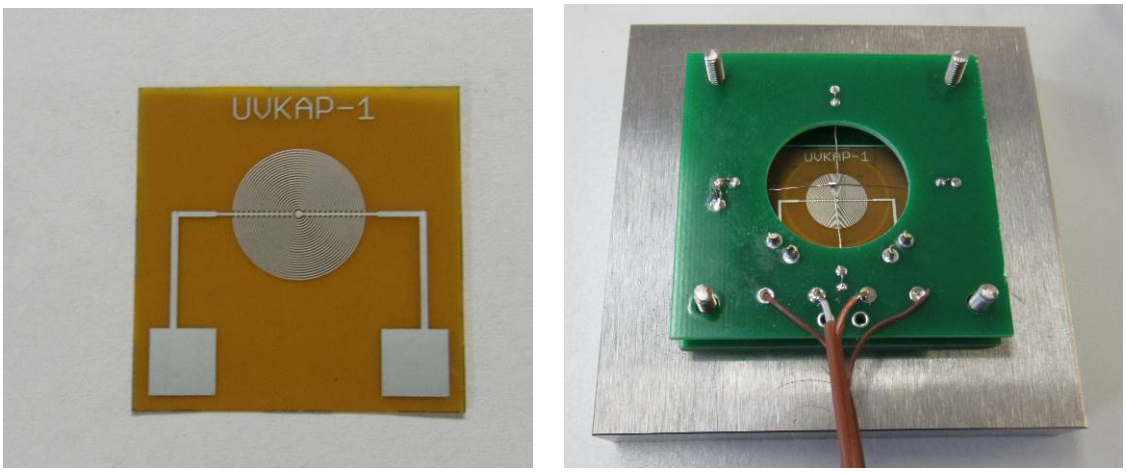

Figure 1
UV Cure Sensor (left) and Quick-Connect Fixture (right)

DESCRIPTION

The UV Cure Sensor is a thin, inexpensive dielectric sensor designed for studies of UV cured resins, where ease of use and low cost are important. Fabricated on a polyimide substrate, the sensor is 2.45 cm (1.00") square and only 100 um (0.004") thick. The tin-plated electrodes have 100 um (0.004") widths and separations. The UV Cure Sensor measures the dielectric/conductive properties of materials within approximately 100 um (0.004") of the electrodes, allowing cure monitoring at the bottom of a thin layer of resin, away from the surface and the oxygen inhibition region.

The Quick-Connect Fixture has a cover that magnetically clamps to a steel base. Spring-loaded pins on the cover make contact with the UV Cure Sensor for effortless connection to the LTF-631 High Speed Dielectric Cure Monitor. A thermocouple suspended above the sensor heats during UV exposure, enabling measurement of the time, duration and approximate intensity of irradiation.

The LTF-631 High Speed Dielectric Cure Monitor, with the UV Cure Sensor and the Quick-Connect Fixture, becomes a complete system for testing UV cured resins. With CureView data acquisition and analysis software, the LTF-631 measures cure state in real time—more rapidly than any other method for studying these materials.

SENSOR SPECIFICATIONS

Dimensions:

Length x width	: 2.54 cm x 2.54 cm (1.00" x 1.00")
Thickness	: 100 um (0.004")
Width, electrode	: 100 um (0.004")
Spacing, electrode	: 100 um (0.004")

Composition:

Substrate	: Polyimide
Electrodes	: Copper with tin flash

Operational Temperature:

Maximum tolerance	: 375 °C (700 °F)
Maximum for measurement	: 100 °C (212 °F)

Sensor Parameters: A/D ratio = 26 cm Base capacitance = 20 pF*
* Actual value may vary

Temperature sensor : None

QUICK-CONNECT FIXTURE SPECIFICATIONS

Dimensions, base:

Length x width	: 7.62 cm x 7.62 cm (3.00" x 3.00")
Thickness	: 1.27 cm (0.50")

Weight, base: : 0.6 kg (1.3 lb)

Composition, base: : Mild steel

Composition, cover: : FR4 glass reinforced epoxy laminate

Themocouple: : Type J

Lambient Technologies L.L.C.
649 Massachusetts Avenue, Cambridge, MA 02139, USA
(857) 242-3963
https://lambient.com
info@lambient.com

USE OF UV CURE SENSOR WITH QUICK-CONNECT FIXTURE

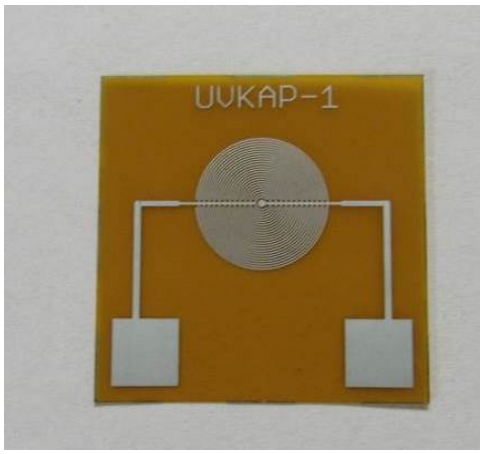

Figure 2
UV Cure Sensor

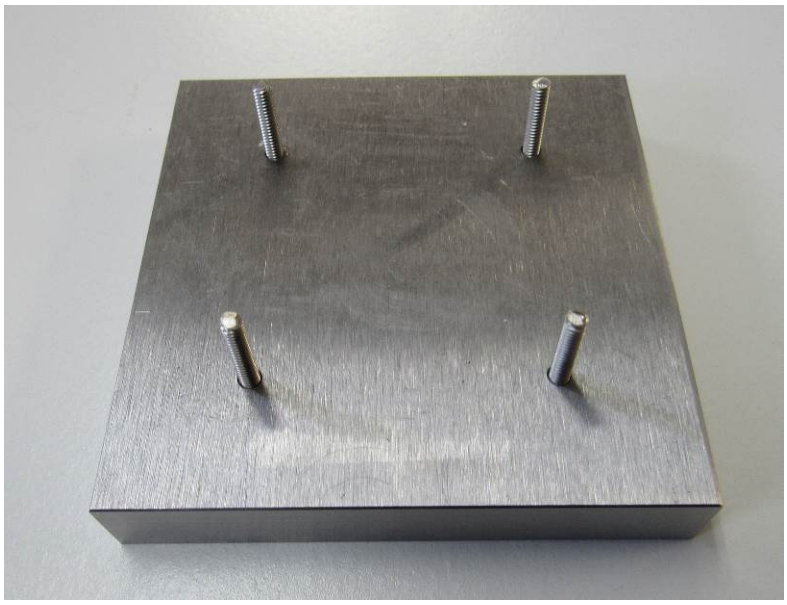

Figure 3
Quick-Connect Fixture base

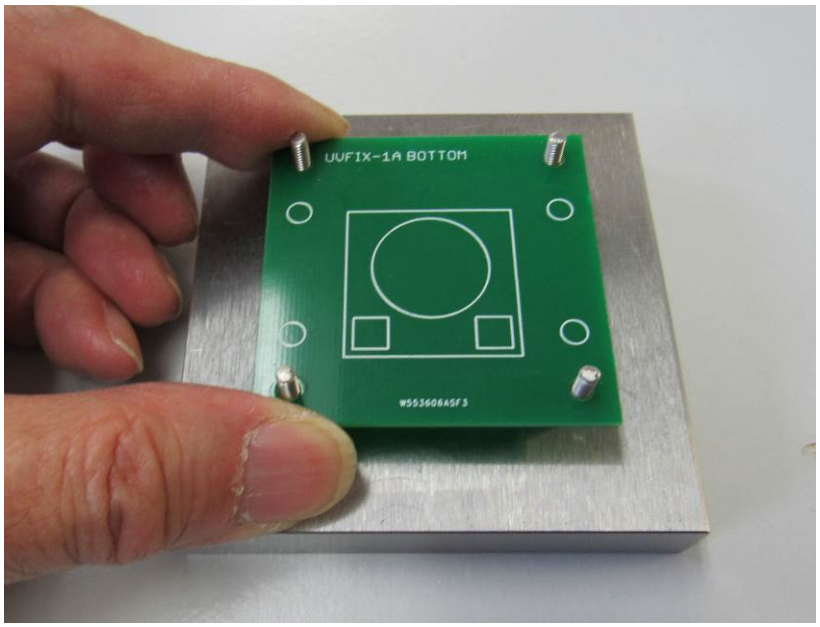

Figure 4
Placing sensor carrier on base

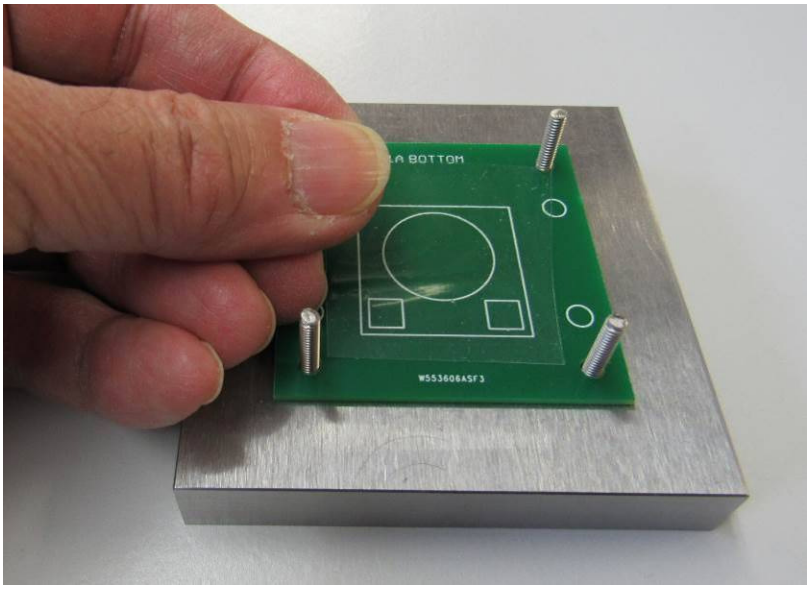

Figure 5
Applying non-adhesive, reusable cling film to sensor carrier

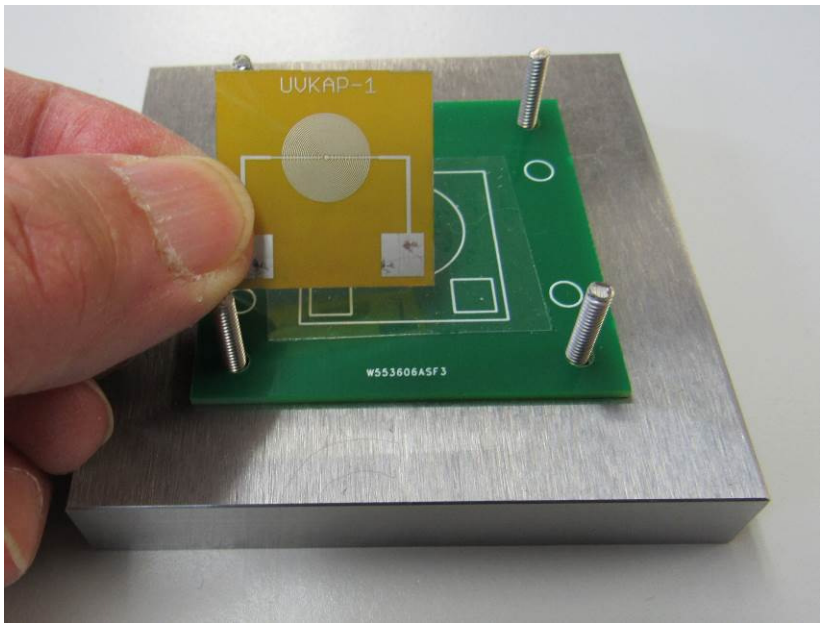

Figure 6
Placing UV Cure Sensor on carrier

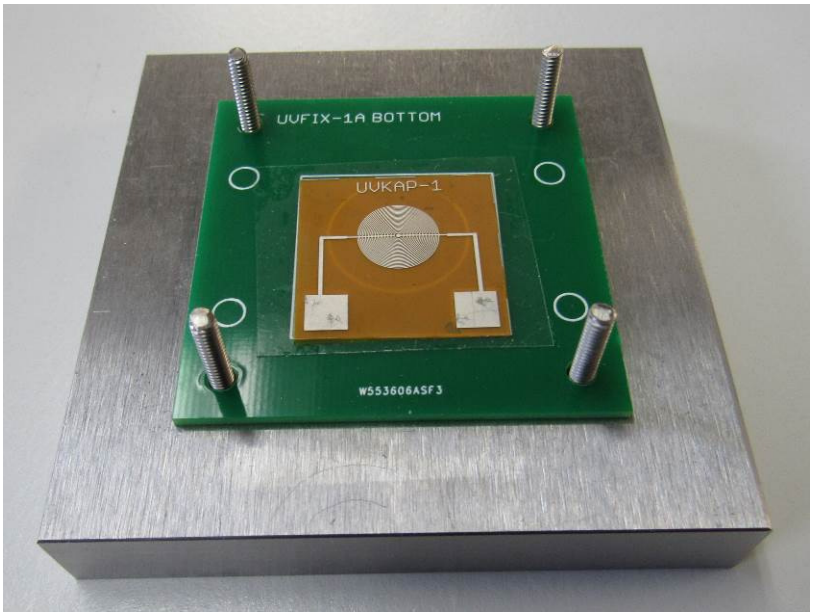

Figure 7
Adhesiveless film secures UV Cure Sensor to carrier for easy application and removal

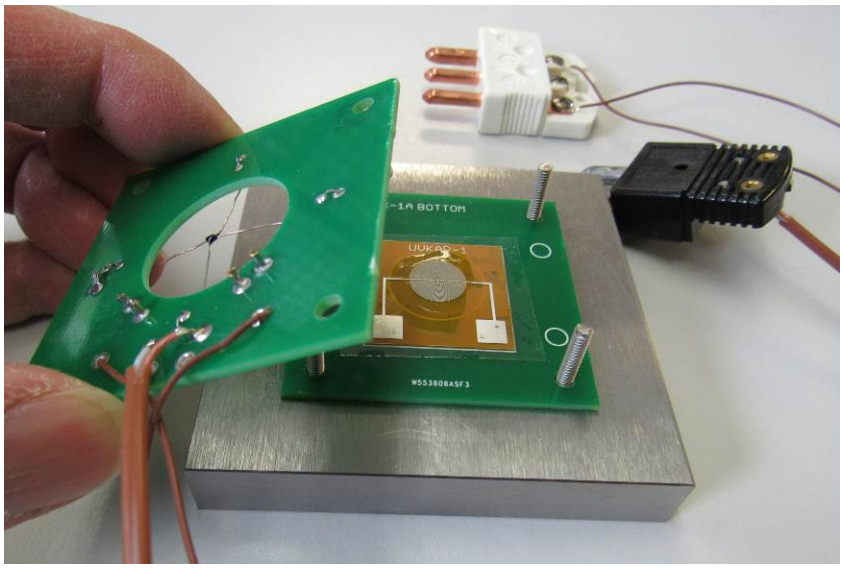

Figure 8
Placing top cover over UV Cure Sensor after application of resin

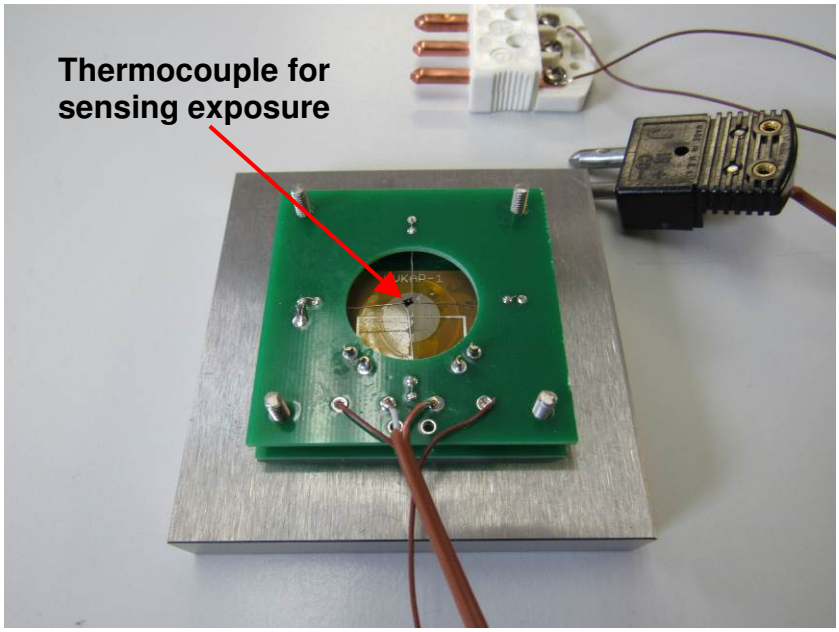

Figure 9
Assembled Quick-Connect Fixture with UV Cure Sensor

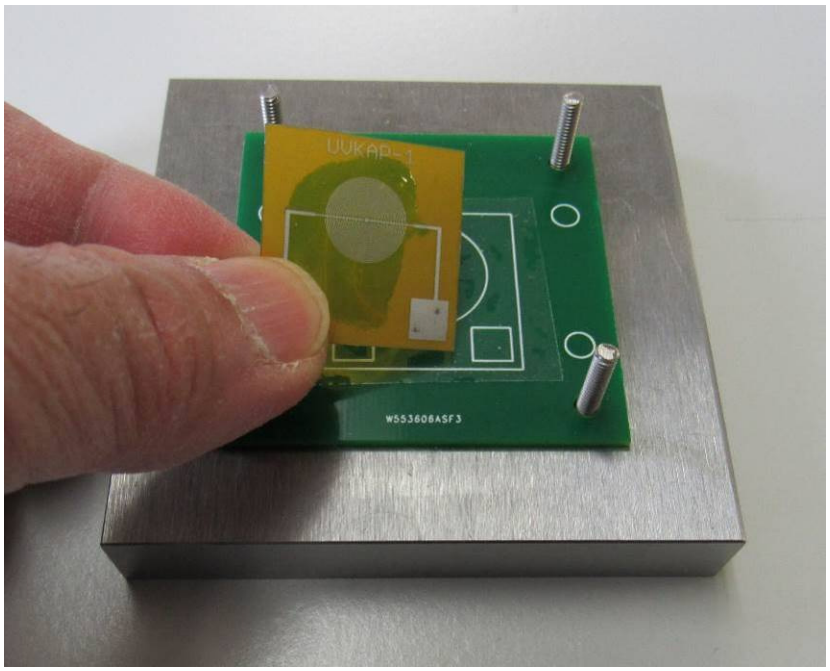

Figure 10
Removing UV Cure Sensor after test

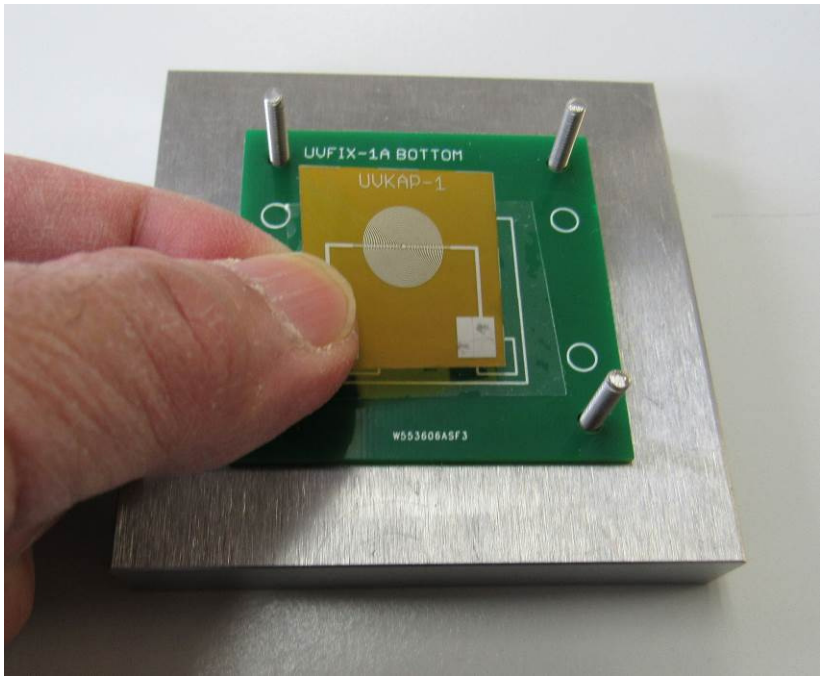

Figure 11
Placing new UV Cure Sensor on reusable cling film for next test

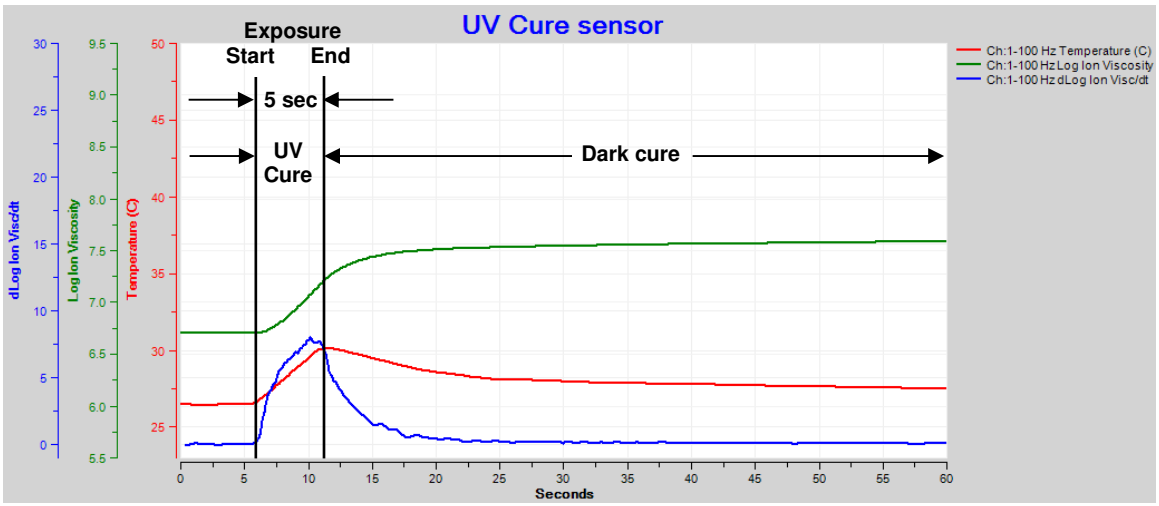

Figure 12
Test of Quad-Cure 1933 with UV Cure Sensor in Quick-Connect Fixture, five-second exposure

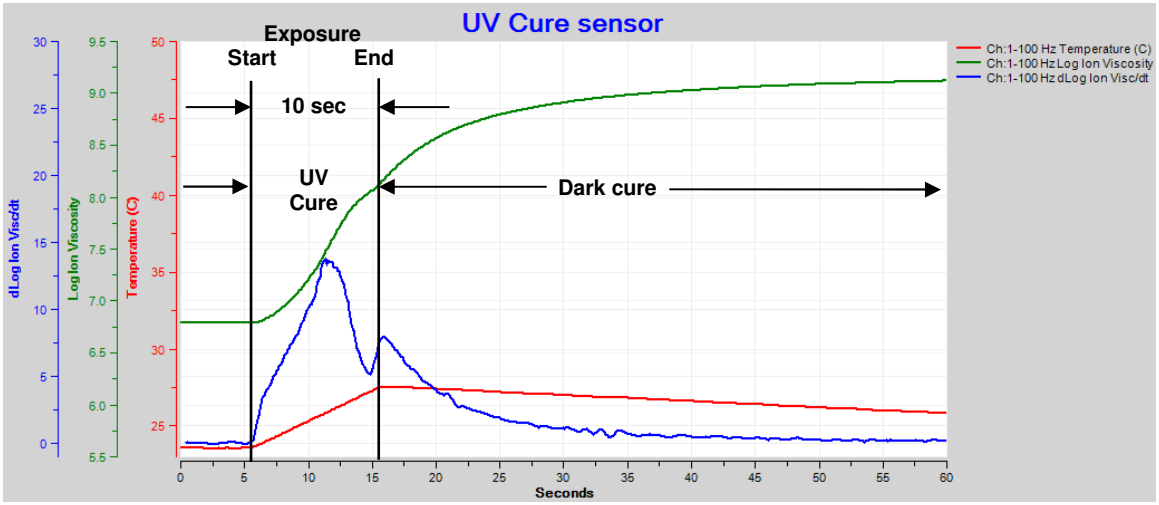

Figure 13
Test of Quad-Cure 1933 with UV Cure Sensor in Quick-Connect Fixture, 10-second exposure

Figure 12 shows ion viscosity, slope of ion viscosity and temperature for a test of Quad-Cure 1933, a UV curable acrylate adhesive manufactured by Incure. The resin was exposed for five seconds to a broad-band UV/visible arc light, indicated by the increase in temperature between 6 and 11 seconds. When irradiation ended, the temperature decreased, showing how the thermocouple of the Quick-Connect Fixture can confirm the time and duration of exposure.

Ion viscosity, which correlates with cure state, increased after the start of irradiation and continued to increase after exposure ended. Dark cure is caused by the persistence of generated photoinitiators and eventually ended at 30 seconds, shown by the nearly constant ion viscosity level at that time.

In Figure 12 the change in ion viscosity between the start and end of cure is about 0.75 units on the log scale, and correlates with a certain increase in the degree of cure. Figure 13 shows a second test of Quad-Cure 1933 with the same intensity of UV irradiation but a longer exposure of 10 seconds.

As with the first test, Figure 13 shows both UV cure and dark cure, but dark cure continued past 60 seconds and resulted in a much greater change of 2.45 units in ion viscosity on the log scale, corresponding to an increased degree of cure from the longer exposure.

Lambient Technologies L.L.C.
649 Massachusetts Avenue, Cambridge, MA 02139, USA
(857) 242-3963
https://lambient.com
info@lambient.com