



ANALYTICAL INSTRUMENT FOR MONITORING PHOTOPOLYMERIZATION REACTIONS

Technical Description

Currently, photopolymerization reactions are monitored using differential scanning photocalorimetry and real time infrared spectroscopy. Each of these two methods alone or in combination provides little information on the magnitude and effects the heat evolved during the reaction on the kinetics and the extent of the polymerization process. In addition, drawbacks of reproducibility, sample size, inability of providing information about the simultaneous changes in the environment and physical state of the sample, and the high cost of instrumentation, makes it extremely prohibitive for a wider and general use of these two analytical techniques in QC labs and production line operations.

The present invention overcomes cost and provides real time sample information as the sample proceeds through its photoreactive phase. Through the direct, continuous and remote monitoring of the sample using optical pyrometry, the temperature of the monomer undergoing photopolymerization can be obtained as a function of time. This new analytical instrument is an inexpensive research and QC tool that can be used to study and evaluate such essential parameters as light intensity, photoinitiator concentration and monomer reactivity I a wide variety of UV curing applications.

The flexibility of the instrument makes it suitable for the rapid optimization of formulations as well as a quality control/product assurance tool for a number of current industrial processes, such as, the UV curing of printing inks, coatings, adhesives and 3D (stereolithography) parts.

Technology Benefits

- Rapid analysis of the photocuring process.
- Especially useful in formulations studies, quality control and other similar applications.
- Supports an industry where photoinduced reactions provide higher conversions, greater process efficiency and reduce environmental impact.
- The application spaces for this technology exists within the following industries: semiconductor manufacturing, optoelectronics components, stereolithography, printing, fiber optic coatings, films, wood/metal/plastic coatings, and adhesives.

Stage of Development

Rensselaer has patent pending on this technology.

Inventor

James Crivello

Contact Information

Please direct all inquiries, request for further information or general discussion on licensing terms to Director, Office of Technology Commercialization, using the information provided below.

Rensselaer Polytechnic Institute
110 8th Street | Troy, NY 12180-3590 | J Building
Phone (518) 276-6023 | Fax (518) 276-6380 | www.rpi.edu/dept/otc