

## **Kinetics of varnish long-term drying process monitored by a heterogeneous optical sensor system**

F A M Saccon, F M D R de Oliveira, M O Ribas, P Zambianchi Jr, M Muller and J L Fabris

### **Abstract**

The drying process of an acrylic varnish film was monitored over 24 h by a heterogeneous optical sensor system. The system employs a fibre optic transducer based on Bragg gratings and optical coherence tomography, operating respectively around 1.55 and 1.3  $\mu\text{m}$ . The sensor is able to provide information about the temporal evolution of temperature, mechanical deformation, thickness and average refractive index of the coating during the drying process. Resolutions for these optically measured parameters are 0.05  $^{\circ}\text{C}$  (temperature), 0.5  $\mu\epsilon$  (strain), 1.5  $\mu\text{m}$  (thickness) and 0.004 (refractive index). Besides, the sensor can detect the growth of a surface dry skin and supply information about the film bulk uniformity. A model for the mass loss of solvent as the drying process evolves is also discussed.

### PACS

[07.60.Vg Fiber-optic instruments](#)

[42.81.Pa Sensors, gyros](#)

[42.79.Dj Gratings](#)

[07.07.Df Sensors \(chemical, optical, electrical, movement, gas, etc.\); remote sensing](#)

### Subjects

[Instrumentation and measurement](#)

[Optics, quantum optics and lasers](#)