TA Instruments

Thermal Analysis & Rheology

RHEOLOGY SOLUTIONS

THICK FILM PASTE CHARACTERIZATION

PROBLEM

In the process of developing products for use in screen printing applications, a supplier of dielectric pastes identified a problem associated with the flow properties of a new thick film paste. After deposition on the substrate, the new paste did not maintain the desired shape definition.

SOLUTION

Controlled stress rheology, which measures the deformation and flow of materials under an applied stress, provides a convenient method (creep test) for predicting the "sagging" properties of materials under the effects of gravity. The material is initially sheared (approximates spreading on the substrate), then exposed to a constant force (approximates gravity) and the further flow (sagging) is monitored with time (creep test). After a significant time period, the force is removed to determine if any recovery from the deformation occurs. Figure 1 shows the creep and recovery curves for two dielectric pastes. Paste A is the original formulation which did not maintain shape. Paste B is the same paste deliberately modified in an attempt to improve its flow properties. The results clearly indicate that Paste B is better since is sags less (has a lower compliance) and recovers closer to its initial state.

Another rheological technique (the flow test) can be used to provide more information about the structural recovery in these materials. In this test, the pastes are sheared at increasing stress levels, then maintained at a high stress level for a period of time. This process essentially destroys the material's structure. Then, the applied stress is gradually decreased, and the increase in viscosity (rebuilding of structure) is measured. Figure 2 reconfirms that the modified paste (B) rebuilds its structure faster than the original paste (A).

Figure 1. CREEP CURVES

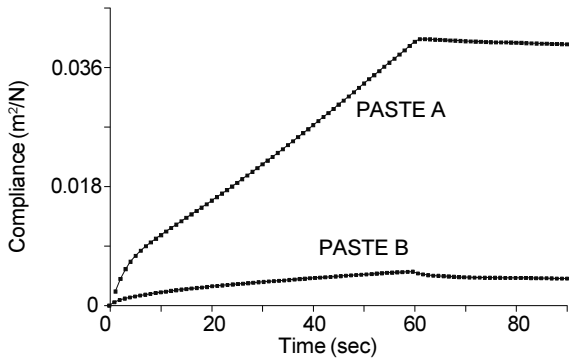
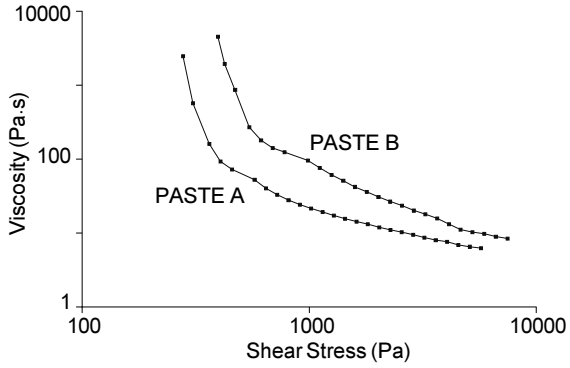


Figure 2. DECREASING STRESS CURVES



For more information or to place an order, contact:

TA Instruments, Inc., 109 Lukens Drive, New Castle, DE 19720, Telephone: (302) 427-4000, Fax: (302) 427-4001
TA Instruments S.A.R.L., Paris, France, Telephone: 33-01-30489460, Fax: 33-01-30489451
TA Instruments N.V./S.A., Gent, Belgium, Telephone: 32-9-220-79-89, Fax: 32-9-220-83-21
TA Instruments GmbH, Alzenau, Germany, Telephone: 49-6023-30044, Fax: 49-6023-30823
TA Instruments, Ltd., Leatherhead, England, Telephone: 44-1-372-360363, Fax: 44-1-372-360135
TA Instruments Japan K.K., Tokyo, Japan, Telephone: 813-5434-2771, Fax: 813-5434-2770

Internet: http://www.tainst.com

TA Instruments
Thermal Analysis & Rheology
A Subsidiary of Waters Corporation