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Analytical Chemistry and Materials Development Group 3531
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To: Helena Armandula **3/2/2006**
From: Mark S. Anderson
Subject: LIGO: Protective Polymer for Optics (First-Contact)

Purpose

The First Contact™ polymer product that is used to protect and remove particles from optical surfaces was submitted. This was to determine if molecular residue remains after peeling off glass surfaces.

Method

A glass test surfaces were pre-cleaned and tested to a level of less than 0.01 micrograms per square centimetre of molecular residue. The polymer solution was painted on to the clean glass and set for 2 hours. The material was then peeled of the surface. The surface was sampled using a dichloromethane swab/rinse. The low volatility residue (LVR) was analyzed using Diffuse Reflectance/ Fourier Transform Infrared (DRIFT/FTIR) spectroscopy. FTIR provides chemical functional group information for quantitative analysis and qualitative identification of materials. The analysis followed the ACL-120 procedure that complies with Mil-STD-1246C Notice 3 and is sensitive to the most stringent level (A/100).

Results

The product is a **polyurethane** based polymer that was dissolved in an acetone/alcohol solution. The polymer is also soluble in dichloromethane. The glass surface that was treated with First Contact™ (applied and removed) was very clean with less than 0.02 micrograms per square centimetre of molecular residue.

Discussion

First Contact™ product leaves very little residue on a smooth glass surface. It must be applied thick enough (particularly at the edges) and peeled carefully. If this product is not carefully removed it could add significant polymer contamination. The First Contact™ polymer does UV fluoresce somewhat, so a UV light and low power magnification may be used to inspect for remaining polymer.