CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1999
DateRun:	11/01/1999
Experimenters:	Jason Marshall
ClientType:	Consultant
ProjectNumber:	Project #1
Substrates:	Ceramics, Alumina
PartType:	Coupon
Contaminants:	Alcohol
Cleaning Methods:	
Analytical Methods:	FTIR
Purpose:	To evaluate previously cleaned coupons to determine trace amounts of contaminants
Experimental Procedure:	Fourier Transform Infrared spectroscopy correlates vibrational energy to a compound's molecular signature. Similar to other high-tech methods such as GC (gas chromatography), the curves generated in this analytical technique are both quantitative for species identification (the placement of the curve on the electromagnetic spectrum) and qualitative for amounts (the area under the curve). A relatively expensive instrument, an FT-IR spectrometer requires special training and care in sample preparation. Not all contaminants can be analyzed this way and interpretation of graphs can be difficult due to the presence of interfering peaks. It may be used in cleanrooms or disk drive manufacture where the origins of contamination may be entirely unknown and the amounts of contamination very low. The FTIR can be used in surface cleaning for analysis of samples. The instrument can be used in a couple of ways. One method would be in determining the type of contaminant and the other would be to determine the amount of contaminant that is on a sample. In the first use of the FTIR, a sample is placed into the instrument and scanned. The resulting scan would give a range of peaks throughout the spectrum. These peaks can be compared to other known values stored in libraries. Any possible match would be listed and the unknown contaminant can be determined using the matching scan. The second method used can help to determine how clean a sample is when compared to another. To perform this task, a series of samples can be scanned and compared to each other. First a certain peak range that is common to all the samples should be selected. The selected range should have a sharp peak and be easily distinguishable. Once a range has been chosen, the area under the peak should be analyzed in each sample and then compared to each other. The smaller the area under the peak, the less contaminant there is, and the cleaner the sample. After establishing the background readings, a clean ceramic coupon was scanned and the image was saved. The coupon was then coated with a substantial amount of the Evanol and the coupon was scanned again. The two images were compared to determine if any differences were observed. Once a region of the two samples was identified, additional clean and dirty samples were run to verify the results. Having found an area relating to Evanol amounts, two of the coupons cleaned in previous trials were analyzed and graphed along with the baseline samples. SUBSTRATE MATERIAL: Ceramic-Alumina coupons CONTAMINANTS: DuPont Evanol Concentrated (Vinyl Alcohol Polymers & Copolymers CAS#s: 9002-89-5, 25213-24-5, 54626-91-4; Methanol Bulk/Packaged CAS #: 67-56-1; Sodium Acetate CAS#: 127-09-3)
Results:	Comparing the previously cleaned coupons to the dirty and clean baselines, it was apparent that FT-IR could be used to determine if there was any Evanol remaining on the coupons. See Figure 1 for comparisons.
Summary:	
Conclusion:	FT-IR analysis of the ceramic coupons previously cleaned was determined to be a potential method for determining if any Evanol contamination was present on coupons. Of the two coupons evaluated from the previous trial, the analysis showed no signs of Evanol remaining on the coupons.