



### **B43 Differentiation of Glitter Lip Glosses Using Pyrolysis-Gas Chromatography/Mass Spectroscopy**

*Lawrence Quarino, PhD, Megan M. Zellner, BS\*, and Lori Gilstrap, BS, Cedar Crest College, Department of Chemical and Physical Science, 100 College Avenue, Allentown, PA 18104*

The goal of this presentation is to teach methodologies using pyrolysis-gas chromatography/mass spectroscopy that can be used in conjunction with infrared spectroscopy to differentiate cosmetic glitter lip glosses.

This presentation will impact the forensic community by showing the potential of pyrolysis-gas chromatography as a method for the differentiation of glitter lip glosses from the same manufacturer.

Glitter lip gloss is a growing trend in the makeup industry increasing the potential to find this material as trace evidence in criminal investigations and as an aid in establishing a link between individuals at crime scenes. Previous research<sup>1</sup> examined twenty-three different lip glosses from nine common manufacturers using IlluminatIR with QualID software. This research showed that SensIR analysis was successful in distinguishing between lip glosses from the nine different manufacturers. However, it was not able to distinguish between lip glosses within the same manufacturer. A continuation study was performed to determine if further characterization of the original lip glosses within a manufacturer would be attainable using Pyrolysis-Gas Chromatography/Mass Spectrometry (Py-GC/MS). Lip glosses from seven of the nine manufacturers utilized in the previous study were analyzed: Bonne Bell, Caboodles, L'Oreal, Maybelline, NYC, Revlon, and Smackers. Three separate runs were performed on each of the lip glosses on different days to account for reproducibility within a particular type of gloss. Samples were placed on a ribbon probe and pyrolyzed at 800°C for 20 seconds using a CDS Pyroprobe 5000. Ion chromatograms were produced with an Agilent 6890N Gas Chromatograph using an Agilent 5973 mass spectrometer as a detector. Chromatographic runs were performed at a maximum temperature of 325°C for 50 minutes. The GC total ion chromatograms obtained were examined and differences in peaks present and relative ratios of the peaks were noted. In cases where the total ion chromatograms between samples were similar, select ion profiling and variation in pyrolysis temperature was performed to differentiate samples.

In this study, samples of ten of the lip glosses were purchased two years apart and tested to determine whether manufacturer's formulations of lip glosses varied during this time period. Lip glosses of the same color were tested. Results showed identical total ion chromatograms in all ten products from samples purchased two years apart. Therefore, it was determined that manufacturer's formulations did not vary during this time frame and showed no interlot variation. One new color for five different brands of lip glosses was purchased to determine whether the color of the lip gloss has an affect on the total ion chromatograms obtained. Again, results showed identical total ion chromatograms to the original spectra obtained indicating that color has no affect on the results obtained.

All lip glosses tested were differentiated using this method. Thus, Py-GC/MS shows potential to be a valid, reproducible method for the differentiation of lip glosses from the same manufacturer.

#### **Reference:**

- <sup>1</sup> Gilstrap, L., and Quarino, L., "SensIR Characterization of Glitter in Lip Glosses From Nine Manufacturers", Thirty-first Annual Meeting of Northeastern Association of Forensic Scientists, Newport, Rhode Island, 2005.

#### **Glitter Lip Glosses, Pyrolysis, Ion Chromatograms**