



### **B24 Glitter: The Analysis and Significance of an Atypical Trace Evidence Examination**

*Maureen J. Bradley, PhD\*, Preston C. Lowe, MS, and Dennis C. Ward, BS, Chemistry Unit, FBI Laboratory, 935 Pennsylvania Avenue, NW, Washington, DC*

The goals of this presentation are to present the analytical approach and assessment of the significance of an atypical type of trace evidence.

Locard's theory of exchange is demonstrated in this unusual case involving craft glitter. The analytical approach utilizing non-destructive techniques to examine and compare glitter recovered from a crime scene and the suspect's car will be discussed. Numerous commercially available glitter materials were also examined to determine the significance of an association between the case samples.

In the early 1990s, a young mother and her 5-year-old daughter were murdered in the bedroom of their home. Glitter, commonly used by children in arts and crafts projects, was scattered on the bed and carpeting where the victims were found. Vacuum sweepings, as well as other items from the crime scene, were submitted to the FBI Laboratory for trace evidence analysis. Items from the suspect, including carpets and floor mats from his car, were submitted for comparison.

A total of ten pieces of glitter of four different colors were recovered from the driver's side carpet of the suspect's car. Each piece of glitter was comparable in size, shape, and color to corresponding glitter from the crime scene. All were approximately  $1\text{mm}^2$  with an aluminum substrate and each had a distinctive notch on one side. The coating on each piece of glitter was analyzed using Attenuated Total Reflectance (ATR) infrared spectroscopy and scanning electron microscopy with energy dispersive X-ray analysis (SEM/EDXA). These two techniques are non-destructive and required no sample preparation. Based on these analyses, each piece of glitter recovered from the suspect's car was consistent with respect to physical appearance and chemical composition of the substrate and colored coating with glitter found at the crime scene.

In order to evaluate the significance of these findings, eleven different commercially available glitter materials were examined. Through this study, it was determined that the most discriminating feature of this type of sample was the physical attributes. The reference glitter materials varied significantly in size, shape, and color. Further, it was found that a plastic (polyester or poly (vinyl chloride)) substrate was encountered more frequently than a metallic substrate. One reference glitter sample examined was consistent in color, substrate composition, size, and shape with the case samples, complete with the distinctive notch on one side. Instrumental analysis using ATR was not able to discriminate between the physically similar reference glitter and case glitter samples on any of the four colors examined. Utilizing SEM/EDXA however, it was determined that the elemental composition of the coatings on the physically similar reference glitter differed from the case samples in three of the four colors examined. Employing this analytical scheme on all of the glitter samples evaluated, all but one color from one reference sample could not be differentiated from the case samples.

**Locard, Glitter, Atypical**