OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Discrimination studies on electrical tape

Keyword(s): forensic science, trace evidence, pressure sensitive tape, discrimination studies

Submitting subcommittee(s): Trace Materials **Date Approved:** 02/24/2021

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

ASTM E3085-17 Standard Guide for Fourier Transform Infrared Spectroscopy in Forensic Tape Examinations is an existing standard. Planned and in development standards are Standard Guide for Forensic Examination and Comparison of Pressure Sensitive Tapes, Standard Guide for Assessing Physical Characteristics in Forensic Tape Examinations, Standard Guide for Using Scanning Electron Microscopy/X-ray Spectrometry in Forensic Polymer Examinations, Standard Guide for Using X-ray Fluorescence in Forensic Polymer Examinations, and Standard Guide for Using PGC-MS in Forensic Polymer Examinations. These documents were developed using data from the same sample set of now-dated electrical tapes. It is unknown how changes in the manufacturing processes of electrical tapes have affected the discrimination powers of the techniques in the above standards.

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

No.

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

Martinez-Lopez, C., Trejos, T., Mehltretter, A. H., & Almirall, J. R. (2017). Elemental analysis and characterization of electrical tape backings by LA-ICP-MS. Forensic Chemistry, 4, 96-107.

Prusinowski, M., Mehltretter, A., Martinez-Lopez, C., Almirall, J., & Trejos, T. (2019). Assessment of the utility of X-ray Fluorescence for the chemical characterization and comparison of black electrical tape backings. Forensic Chemistry, 13, 100146.

Goodpaster, J. V., Sturdevant, A. B., Andrews, K. L., Briley, E. M., & Brun-Conti, L. (2009). Identification and comparison of electrical tapes using instrumental and statistical techniques: II. Organic composition of the tape backing and adhesive. Journal of forensic sciences, 54(2), 328-338.

Goodpaster, J. V., Sturdevant, A. B., Andrews, K. L., & Brun-Conti, L. (2007). Identification and comparison of electrical tapes using instrumental and statistical techniques: I. Microscopic surface texture and elemental composition. Journal of forensic sciences, 52(3), 610-629.

Brooks, E., Mehltretter, A., Prusinowski, M., & Trejos, T. (2020). Optimization and evaluation of spectral comparisons of electrical tape backings by X-ray fluorescence. Forensic Chemistry, 21, 100291.

Martinez-Lopez, C., Trejos, T., Coulson, S., Goodpaster, J., Igowsky, K., Kuczelinis, F., ... & Almirall, J. R. (2019). Interlaboratory evaluations of the performance of elemental analytical methods for the forensic analysis and comparisons of electrical tapes. Forensic Chemistry, 12, 66-77.

Mehltretter, A. H., Bradley, M. J., & Wright, D. M. (2011). Analysis and discrimination of electrical tapes: Part I. Adhesives. Journal of forensic sciences, 56(1), 82-94.

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest? Is your research need identified by NIJ?

No.

5. In what ways would the research results improve current laboratory capabilities?

The manufacturing processes of pressure sensitive tapes, including electrical tapes, is ever changing. Changes in customer demands, manufacturing processes, and costs of various supplies, can affect the results of analytical techniques. The majority of the current research on the evaluation, comparison, and discrimination of electrical tapes using observed features is from the same collection of electrical tapes. Additional research on a new and more current sample set of electrical tapes will improve an understanding of the proposed analytical techniques to discriminate electrical tapes.

6. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

The subcommittee would benefit from the research in two primary ways: 1) Research leading to the refinement or improvements of existing standards; 2) provide practitioners with sound guidance on how to qualify association types in the context of comparative examinations. Both ways are critical during the revisions of current and in-development standard documents.

7. In what ways would the research results improve services to the criminal justice system?

Trace evidence examiners will be in a better position to characterize, discuss limitations, and interpret electrical tapes given that research on their properties is potentially outdated.

8. Status assessment (I, II, III, or IV): III

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.