

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need: Improvement in the interpretation of glass evidence

Keyword(s): Glass, random occurrence, reconstruction, activity factors, transfer and persistence, databases

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)

The use of broken glass as physical evidence is well established in the criminal justice system, as it is commonly left behind in the form of trace material in kidnappings, robberies, assaults and hit and run cases. Consensus-based standards, research studies, and peer-reviewed literature have laid the foundations of the discipline, particularly for the analysis and conclusions regarding source/class attribution. Nonetheless, current challenges remain on its use during investigative stages and on the overall assessment of the value of the evidence beyond the source level to the activity framework.

The application of more comprehensive interpretation models is currently limited due to: a) the need to increase and maintain databases, b) gaps of information regarding the mechanisms of transfer and persistence of glass, and c) lack of studies on the random occurrence of glass in U.S. populations. Although some efforts have been conducted with regards to databases and persistence of glass, there are no studies that report baseline data of traces of glass in the United States. In the absence of local data regarding the prevalence of glass fragments on the general public—relative to those involved in an alleged event—the use of glass in our courts would not be used to its full potential.

This research can result in a new standard for the interpretation of glass evidence.

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, we are not aware of any ongoing research that may address this research need that has not yet been published.

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)

1. ASTM E1967-11a Standard Test Method for the Automated Determination of Refractive Index of Glass Samples Using the Oil Immersion Method and a Phase Contrast Microscope, ASTM International, Vol 14.02
2. ASTM E2330-12. Standard Test Method for Determination of Concentrations of Elements in Glass Samples Using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) for Forensic Comparisons, ASTM International, Vol 14.02
3. ASTM E2926-17. Standard Test Method for Forensic Comparison of Glass Using Micro X Ray Fluorescence (μ -XRF) Spectrometry, ASTM International, Vol 14.02

4. ASTM E2927-16. Standard Test Method for Determination of Trace Elements in Soda Lime Glass Samples Using Laser Ablation Inductively Coupled Plasma Mass Spectrometry for Forensic Comparisons, ASTM International, Vol 14.02
5. Caddy, B. Forensic Examination of Glass and Paint, Analysis and Interpretation. 1st ed, CRC Press Boca Raton FL, 2002.
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7. Curran JM, Hicks TN, Buckleton JS. Forensic interpretation of glass evidence. Taylor & Francis, 2000.
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9. Curran, J. M., Triggs, C. M., Almirall, J. R., Buckleton, J. S., and Walsh, K. A. J., "The interpretation of elemental composition measurements from forensic glass evidence: I," *Science and Justice*, Vol. 37, 1997, pp. 241-244.
10. Daeid NN, McColl D, Ballany J. The level of random background glass recovered from fleece jackets of individuals who worked in Law enforcement or related professions. *Forensic Sci Intl* 191(1-3), 2009, 19–23.
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14. Harrison PH, Lambert JA, Zoro JA. A survey of glass fragments recovered from clothing of persons suspected of involvement in crime. *Forensic Sci Intl* 27, 1985, 171–80.
15. Jackson F, Maynard P, Cavanagh-Steer K, Disting T, Roux C. A survey of glass found on The headwear and head hair of a random population vs. people working with glass. *Forensic Sci Intl* 226(1-3), 2013, 125–31.
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17. Lau L, Beveridge AD, Callowhill BC, Connors N, Foster K, Groves RJ, et al. The Frequency of Occurrence of Paint and Glass on the Clothing of High School Students. *Canadian Society of Forensic Sci J* 30(4), 1997, 233–40.
18. McQuillan J, Edgar K. A survey of the distribution of glass on clothing. *J Forensic Sci Soc* 32(4), 1992, 333–48.
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20. Pearson EF, May RW, Dabbs M. Glass and paint fragments found in men's outer clothing—report of a survey. *J Forensic Sci Soc*, 16, 1971, 283–99.
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22. Robertson B, Vignaux GA, Berger CEH. *Interpreting Evidence: Evaluating Forensic Science in the Courtroom*, 2nd ed. John Wiley & Sons, 2016
23. Roux C, Kirk R, Benson S, Van Haren T, Petterd CI. Glass particles in footwear of members of the public in South-eastern Australia - a survey. *Forensic Sci Intl* 116(2-3), 2001, 149–56.
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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?

Yes, this research relates to the NIJ research need "Construction of new and updating of existing databases with properties of manufactured materials."

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

Glass background surveys have been conducted only outside the U.S., and the existing literature suggests several geographical and socioeconomic factors influence the conclusions that can be inferred from the studies. At the moment, most U.S. crime laboratories limit the use of glass evidence to the comparison of known and questioned glass fragments to make inferences at the source level. Research studies that generate data on background occurrence of glass on U.S. populations and that evaluate factors that could influence the transfer and persistence of glass will offer the criminal justice a valuable body of knowledge and provide a broader contribution to investigative efforts and a more comprehensive assessment of the evidential value of glass in court.

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

At the subcommittee level, this type of research would provide additional support to the interpretation and report writing guidelines that are being developed for glass evidence and trace materials in general.

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

Having new foundations of activity factors and baseline occurrence of glass would provide investigators, forensic examiners, defense and prosecutors, judges and jury with tools for a more overarching use of glass to assist in the judicial process.

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

I

	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.