

# OSAC RESEARCH NEEDS ASSESSMENT FORM



**Title of research need:** Development of Characterized GSR Reference Stubs

**Keyword(s):** Gunshot Residue, GSR, Particulate Size, Reference Material, Instrument Performance, Method

**Submitting subcommittee(s):** Ignitable Liquids, Explosives, & Gunshot Residue **Date Approved:** 3/02/2021

*(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)

Yes. Laboratories using SEM/EDS for characterization of GSR lack access to standardized QA/QC samples that can be used to gauge instrument performance and comparability across laboratories. The community needs access to fully characterized reference stubs that have a known number of particles, a known number of characterized GSR (or GSR simulant) particulates of known particulate sizes and at specifically known locations. The stubs would be used as proficiency tests as well as instrument controls that will allow labs to determine if their procedures are performing adequately and comparably as also demanded in the OSAC approved publication "Proposed Practices for Validating the Performance of Instruments Used for Automated Inorganic Gunshot Residue Analysis" [20]. Furthermore, this research is foundational for development of future validation and error rate studies in order to upgrade the current ASTM E1588 Standard Practice into a Standard Test Method. On behalf of the ENFSI Expert Working Group Firearms/GSR, the BKA in Wiesbaden, Germany, started some years ago the development and preparation of identical GSR test sample sets simulating "real case samples" by using a special technique to produce synthetic GSR particles [2, 9]. These types of samples are currently successfully used by the ENFSI Expert Working Group Firearms/GSR in performing proficiency tests [12, 13]. A modified/alterred set of synthetic samples using recurrent/repetitive structures of synthetic GSR particles could be designed and produced in order to improve method validation, especially for modern nontoxic primer ammunitions.

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)?

There are no current research or studies known, that focus on the development and production of synthetic GSR for method validation and optimization.

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)

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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?

No.

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

Reference stubs made specifically for GSR analysis are vital for establishing baseline method capabilities, figures of merit, and for QA/QC. There currently are:

- no two-component reference stubs representing Sinoxid® type ammunition, and
- no reference stubs representing various types of “nontoxic”, “lead-free” ammunition available.

A new design for reference samples should be developed and produced with recurring/repetitive structures allowing a quick and reliable control of SEM/EDS system validation and performance optimization for case work as also demanded in [20].

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

The availability of these reference stubs would help gauge method performance and capabilities across different laboratories.

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

By helping to ensure that methods and instruments are working properly and as per performance specifications found in standardized methods.

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.*