

**CHEM-06 SEM Sample Collection from Evidence for
Gunshot Residue Analysis**

Document ID: 1318
Revision: 5
Effective Date: 06/25/2025
Status: Published
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Approved by Director: Dr. Guy Vallaro

1. Purpose

To collect samples for the possible presence of primer gunshot residue (pGSR/GSR).

2. Responsibility

Analysts authorized to perform SEM sample collection for GSR analysis.

3. Equipment

- a. Aluminum stubs (SEM/GSR stubs) (Electron Microscopy Sciences or equivalent)
- b. Carbon adhesive tabs (double-sided, suitable for GSR collection) (Electron Microscopy Sciences or equivalent)
- c. Deionized (DI) water (Millipore or equivalent)
- d. Isopropanol (reagent grade or higher)
- e. General laboratory equipment/materials (e.g., tweezers, Kimwipes, kraft paper, gloves, etc.)
- f. Digital camera

4. Procedure:

a. Preparation

- i. All evidence is handled in accordance with general laboratory (GL) policy.
- ii. Case notes will be taken and recorded within LIMS or on worksheets.
- iii. Sampling of evidence for GSR will not occur within the SEM laboratory room/space.
- iv. Perform a visual examination of the evidence, taking photographs to capture the condition of the evidence, its packaging, and any relevant markings or labels. Photographs of the exterior of the evidence packaging should be taken prior to the evidence being opened or unsealed by the Chemistry Unit.
- v. Evidence removed from its packaging is not to come into contact with surfaces that have not been cleaned with isopropanol, allowed to fully dry, and covered with a barrier layer (e.g. kraft paper) to prevent contamination. Cleaning and preparation of the examination area will be conducted between different items of evidence.
- vi. Examination gloves will be changed between the handling and sampling of evidentiary items.
- vii. To prepare SEM stubs for collection, affix an unused carbon adhesive tab to the top of a new aluminum stub, leaving the paper backing on the other side of the adhesive tab intact. Prior to sampling, remove the paper backing with clean tweezers to expose the collection side of the adhesive.

b. Sample Collection

- i. All items packaged separately will be sampled separately.
- ii. Items packaged together, and in contact with one another, may be considered the same item and may also be sampled together (with or without multiple SEM stubs or sub-items being generated).

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- iii. The areas sampled on an item of evidence, and their associated SEM stubs, will be recorded within LIMS or on worksheets. The FSE 2 (or higher) will be consulted for any atypical situations/evidence.
- iv. To serve as a negative control, a new SEM stub will be placed within the vicinity where the evidence sampling/examination will occur. The negative control stub will be left open within its holder, upright, and exposed to the same sampling/examination environment. The negative control will be labeled to indicate the associated item of evidence. Once sampling/examination of the item of evidence is complete, cap/seal the negative control stub. A separate negative control will be taken for each item sampled.
- v. Additional sampling of evidence (e.g., for Forensic Biology/DNA section) may occur at the same time as sampling for GSR examination. Such sampling will be done by authorized analysts according to procedures within that section.
- vi. Evidence exhibiting damage/defects (e.g., holes, cuts, stains, etc.) will be noted.
- vii. A general sampling for GSR particles using new SEM stubs will be performed.
 - 1. Clothing items
Use new SEM stubs to sample clothing items. The same stub can be used for multiple areas of the same item (as long as the adhesiveness of the stub is still effective). The following are recommended sampling areas:
 - a. Pants/shorts: Sample the outside/inside opening of pockets.
 - b. Long sleeve garments: Sample the front side, sleeve cuffs, and the outside/inside opening of pockets.
 - c. Short sleeve or sleeveless garments: Sample the front side.
 - d. Shoes, hats, accessories, etc.: Sample the outer surfaces.
 - e. Underwear and inner garments: Not typically sampled.
 - 2. Swabs
When swabs are submitted for GSR analysis, the FSE 2 (or higher) will be notified. The submitting agency will be informed that swabs are not routinely analyzed and to refrain from submitting swabs in the future. When approved by the FSE 2 (or higher), a best attempt will be made to sample the swabs using new SEM stubs. Note: Typically, this will only occur if no other evidence is available to be analyzed or sampled for GSR.
 - a. A new SEM stub will be used to sample each swab that needs analysis.
 - b. Any fibers that transfer from the swab to the SEM stub should be removed. If tweezers (or other reusable laboratory equipment/tools) are used, they will be cleaned with DI water and isopropanol prior to reuse.

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3. Additional types of evidence will be sampled according to the best judgement of the analyst and FSE 2 (or higher). The same SEM stub can be used for multiple areas of the same item (as long as the adhesiveness of the stub is still effective).

5. References

General Laboratory (GL) and Section/Unit procedures
ASTM Standards E1588 and E3309