

Challenges Associated with Residue Properties During Contact Sampling

Trace Explosives Sampling for Security Applications
(TESSA) Workshop Series 01

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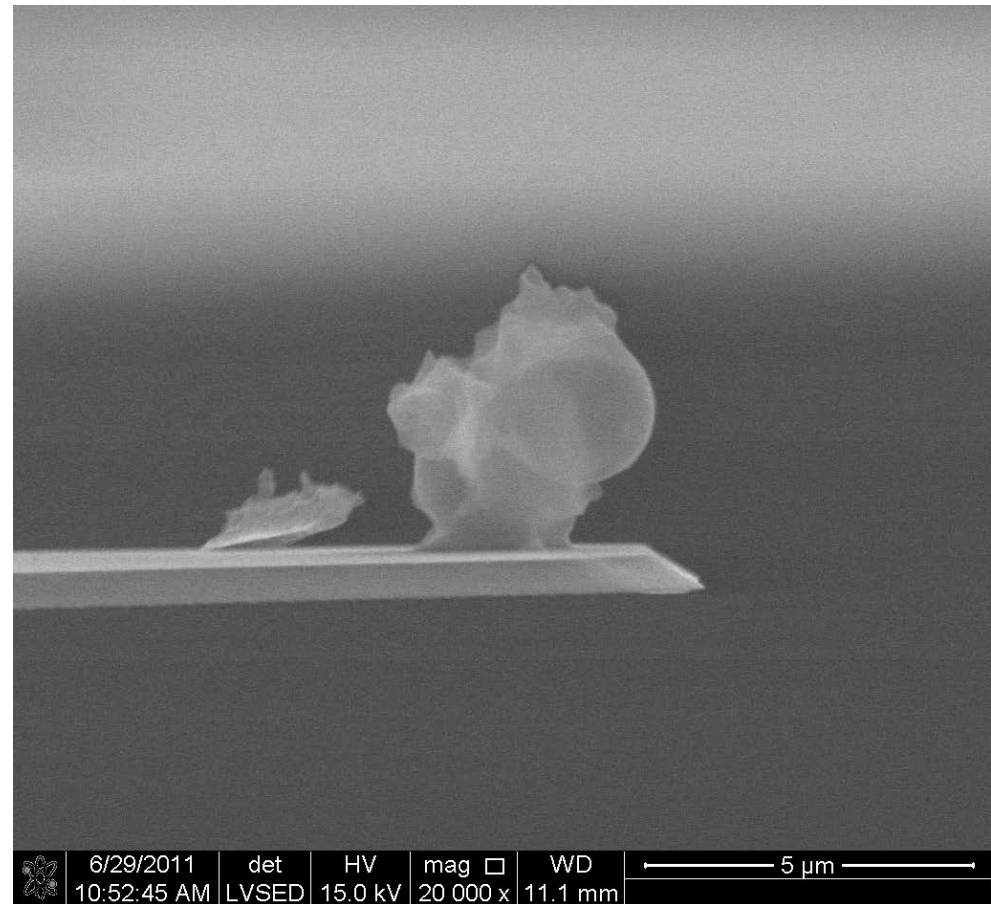
Overview

- Explosives characterization
- Explosives interact with surfaces
- Explosives interact with sampling media
- Environmental effects
- Con Ops and cost considerations
- Potential residue studies



Residue Characteristics of Explosives

- Particle size
(shape/morphology)
- Pure or mixture
(binders/oils,
fingerprints/airborne)
- Vapor pressure (will
residue remain?)
- Replicating residues for
studies



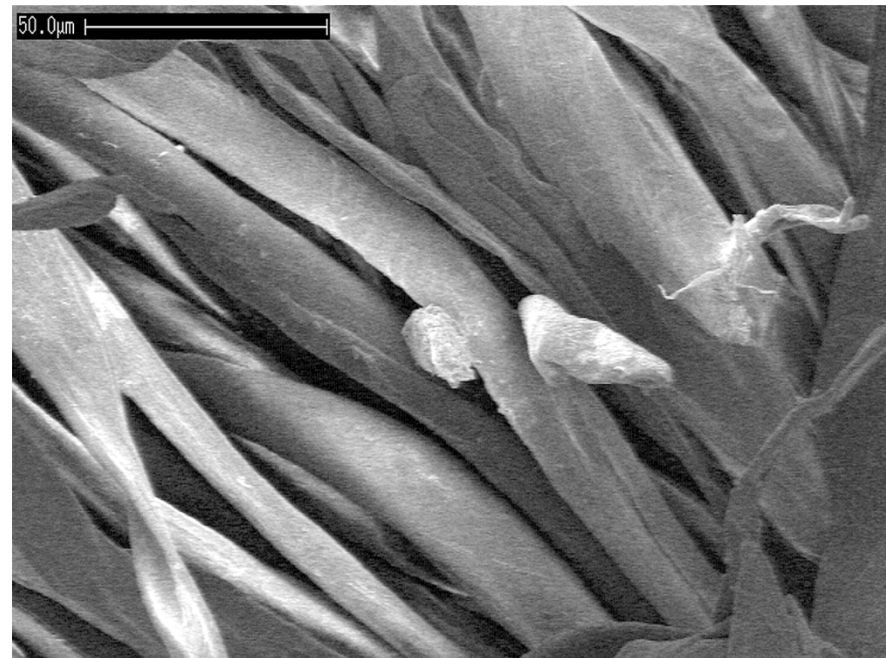
Surface Interactions

- Explosives residues need to adhere to surfaces so signature is available for sampling (this is why trace works!)
- Surfaces then need to release explosives residues for harvesting
- Characteristics to consider include:
 - Electrostatic (stretch wrap, plastics, metals)
 - Physical (rough surfaces, folds, irregularities, dirt)
 - Chemical (coatings, processing agents, dirt, ,moisture)



Sampling Media Interactions

- Explosives residues need to adhere to sampling media after being liberated from surfaces
- Sampling media then need to release explosives residues for detection
- Characteristics to consider:
 - Electrostatic
 - Physical (pore size, dirt)
 - Chemical (coatings, moisture)





Environmental Effects

- Durability of explosive residue is influenced by:
 - Temperature (vapor pressure)
 - Humidity (surface/explosive interaction)
 - Wind (evaporation, sample loss)
 - UV radiation
 - Vibration
 - Time



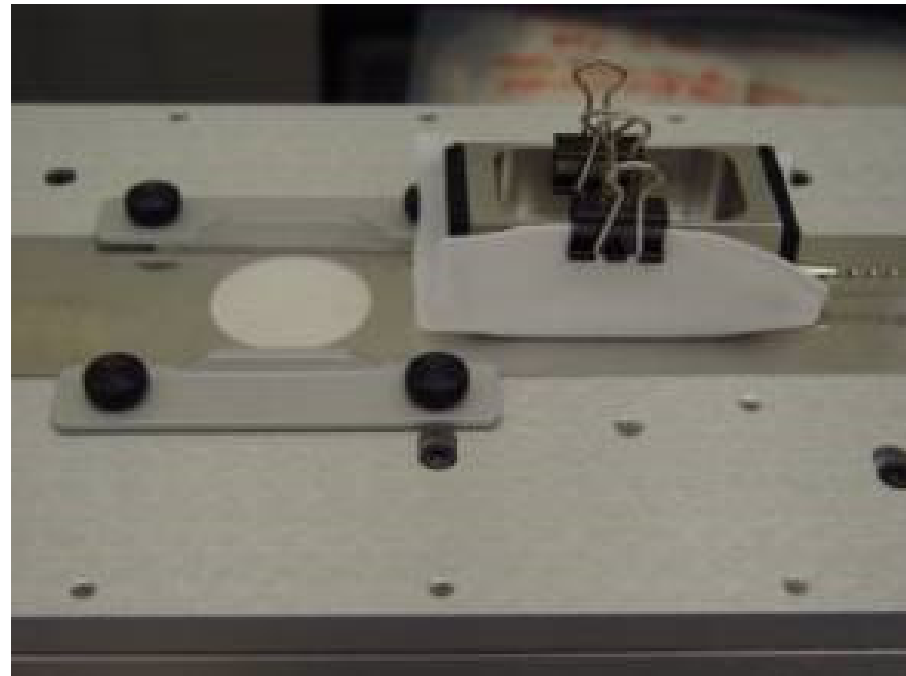
Con Ops and Cost

- Trace residue is not uniformly distributed over a surface (where to sample, contamination mapping)
- Sampling a large surface area (large items, effects of smearing of residue (collect early) or dirt (collect late))
- Multiple use sampling media (effect on harvesting effectiveness, accumulation of dirt)



Potential Residue Studies

- Best methods for generating residues for studies (artificial vs. bulk derived, concentration vs. deposit volume)
- Surface/particle adhesion properties under varied environmental conditions (temperature, humidity)
- Surface/residue/sampling media harvesting efficiency (slip-peel-meter studies: NIST developed process, expand characterization and establish standard method)
- Contamination mapping





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