



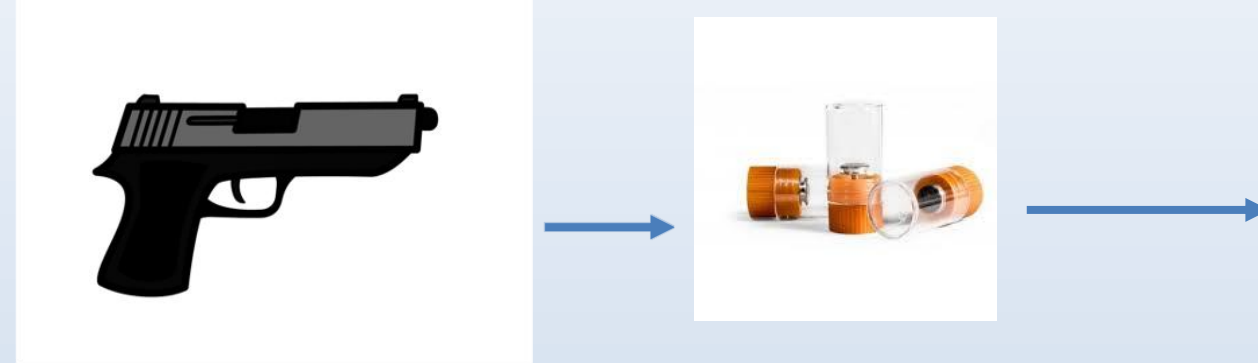
DISCRIMINATION OF GUNSHOT RESIDUE AND PARTICLE RESIDUE FROM BRAKE PAD LINING USING SCANNING ELECTRON MICROSCOPE – ENERGY DISPERSIVE X-RAY(SEM-EDX) AND CHEMOMETRIC METHODS

Problem Statement

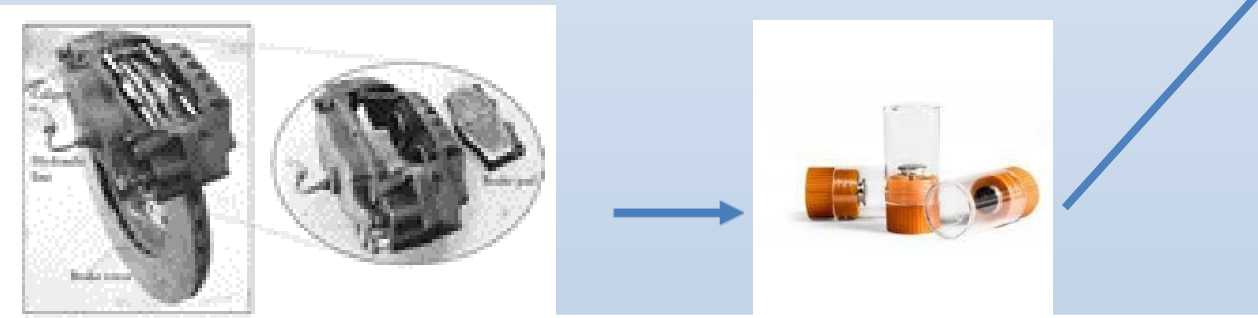
- Firearm-related crimes are among the major concerns to public safety (Naghavi et al., 2018).
- Analysis of gunshot residues (GSR) continues to be crucial in establishing the link between the shooter, the firearm, the victim and the crime scene (Chang et al., 2013)
- Brake pads and tires are associated with potential false positives for GSR (Bueno et al., 2018).
- The question therefore arises whether modern brake pads in Malaysia might still be a relevant source of 'GSR-like' particles as reported by other scholar in the early 2000 and 2017 that contribute to false positive for GSR investigation.

Methodology

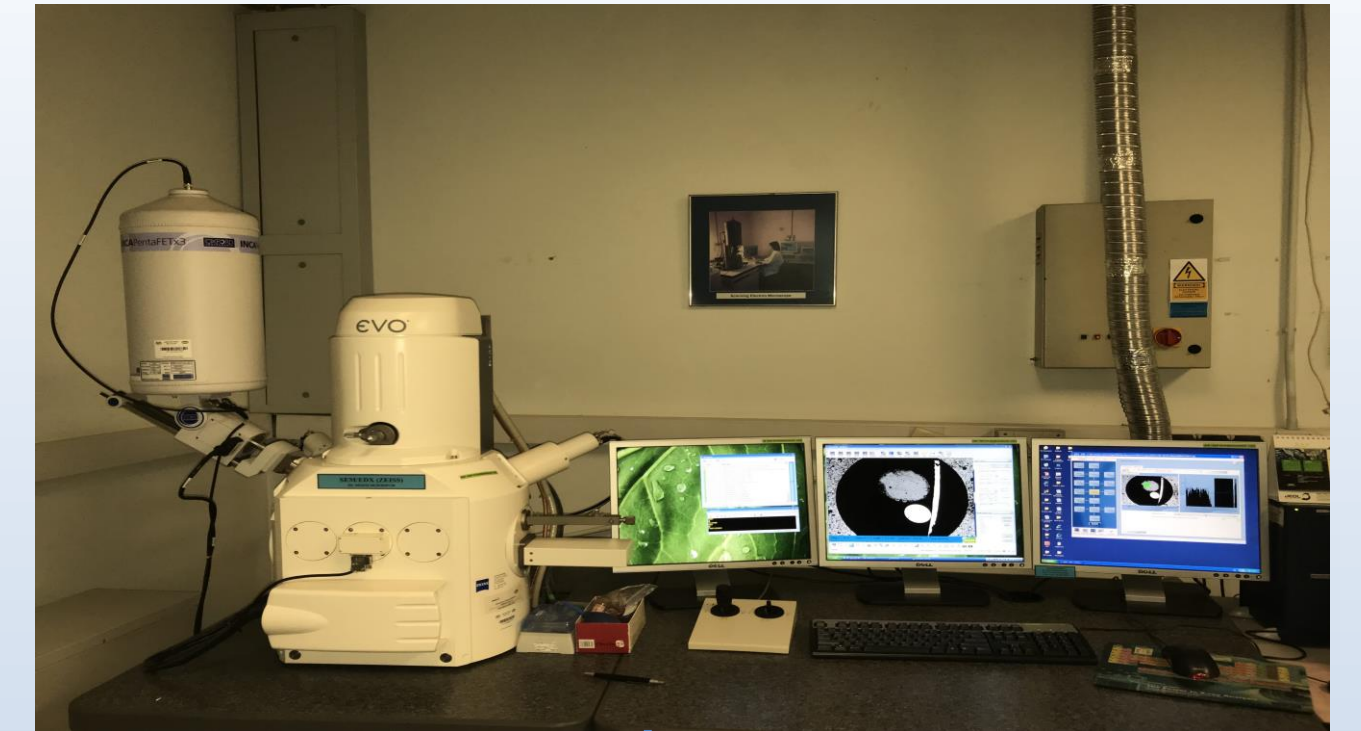
Standard gunshot residue from firearm



Similar gunshot residue particle from brake pad



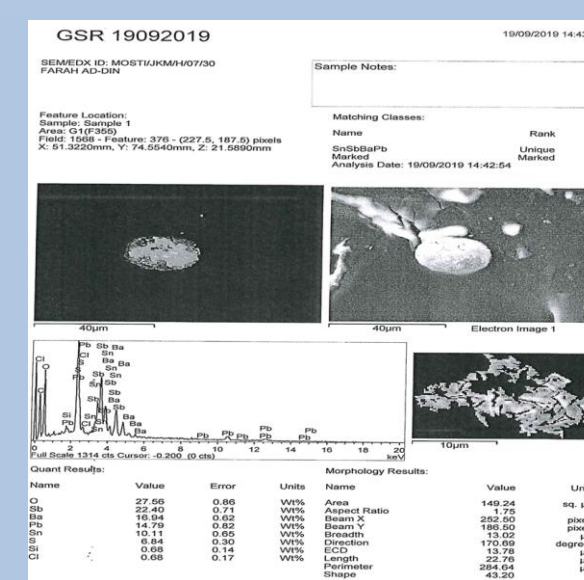
Analysis using SEM-EDX



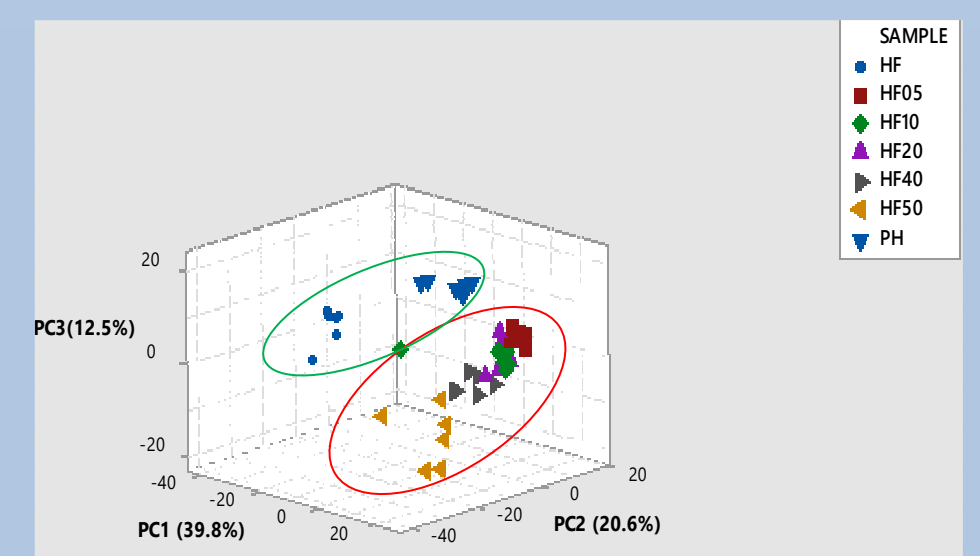
Result obtained : Analyse using chemometric technique

Expected outcome

Able to discriminate GSR from a firearm and GSR-like particles from Brake pad using SEM-EDX and chemometric techniques.



(Result from SEM-EDX)



(Three dimensional PCA score plot)

Significant of Project

- As supporting document to existing GSR test at Dept. of Chemistry
- Assisting Law Enforcement Agencies and Court of Justice to conduct investigation and jurisdiction in firearm related cases.
- Providing knowledge to research communities in firearm-related study.



Conclusion

It is important to be able to discriminate between GSR particle from firearm and GSR particle from brake pad that can be source of false positive, so that impartial and credible judgement can be deliver. Furthermore, by using chemometric techniques the particle can be discriminate without any bias and more simplified way.



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