

# **Extraction of Compounds** from Latent Fingerprints

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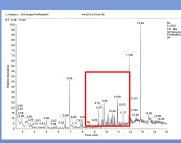
### Introduction

Fluorescent silica nanoparticles (FSNs) can be used to detect and lift latent fingerprints. The FSNs used in this project were hydrophobically modified to increase their ability to bind to the proteins and found in fingerprints. The particles were applied to model prints, and subsequently lifted onto chromatography paper. The lifted prints underwent an extraction process; and the extracts were analyzed using GC-MS.

# **Methods** 6

- 1) Dusted prints on Al foil using hydrophobically modified FSN
- 2) Lifted developed prints onto chromatography paper treated with 10% SDBS
- 3) Chromatography paper cut into strips, then
- 4) Acetone solvent used to extract molecules
- 5) Extracted solution filtered through C-18 syringe plug
- Analyzed filtered solution with GC-MS

### **Results & Discussion**



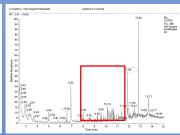


Figure 1: Analysis of "cologne print"

Figure 2: Analysis of "regular print" from Subject B

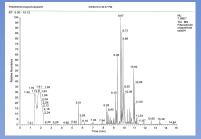


Figure 3: Analysis of cologne

The time period between 9 and 12 minutes demonstrated the presence of a large concentration of compounds extracted from the print that was created by an individual, Subject A, who had applied cologne prior to the print's creation (Figure 1). This

pattern matches that of the cologne standard, seen in **Figure 3**. An individual who did not apply cologne during the printing process, Subject B, left a print with a definitive difference in concentration and pattern of compounds in the time frame between 9 and 12 minutes (compare Figure 1 and Figure 2). The analysis of the print extract in Figure 2 also does not match the spectra produced by the cologne standard.

### Conclusions

GC-MS analysis of compounds extracted from hydrophobically modified FSNs demonstrated the ability to differentiate between fingerprints based on compounds present on the fingertips at the time of the print. Of the solvents tested, acetone proved to be the most effective at extracting compounds from the lifted prints. Additional trials using these hydrophobic FSNs should be conducted to ensure the validity of this method before expanding the research to compare the effectiveness of different FSN on varying surface environments. Other variables to consider in future trials are solvent choice and the variety of compounds that can be extracted and detected.

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