

Forensic Applications of Fluorescent Silica Nanoparticles

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INTRODUCTION

Fluorescent silica nanoparticles (FSN) can be prepared by adding dye into standard mesoporous silica nanoparticle formulations.¹ The surface of FSN can be easily modified, which makes FSN very versatile. The goal of the research presented here is to apply FSN to latent fingerprint analysis. Several types of FSN were prepared—each having different surface functionalities. The functionalized FSN were designed to bind to proteins and oils within fingerprints. Latent fingerprints were generated by dusting surfaces with FSN and by dusting/glue-fuming techniques. Methods to lift and preserve FSN generated latent prints were also studied.

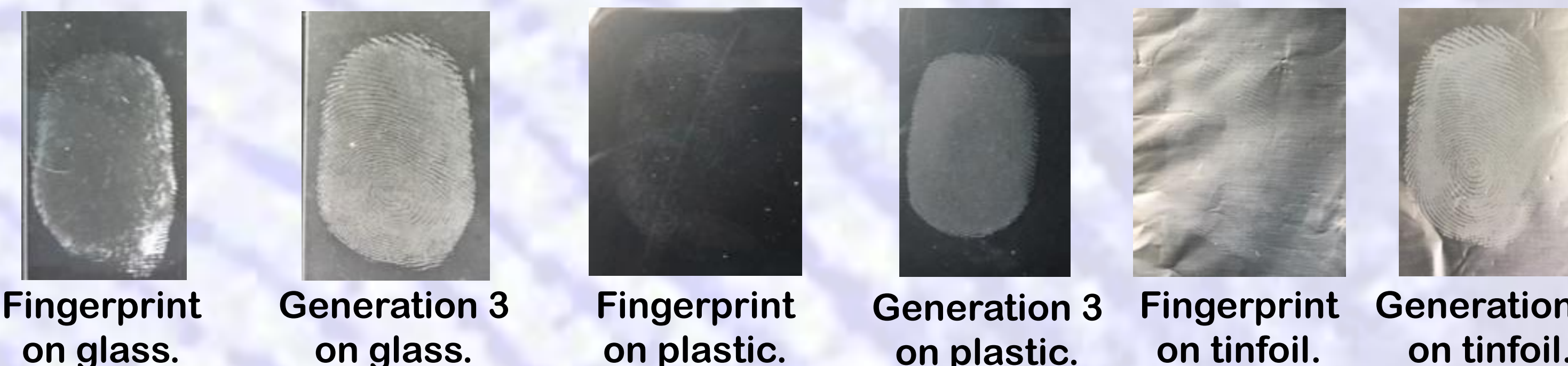
RESULTS & DISCUSSION

Surface Modification

FSN with different surface functionalities were prepared to determine what type of surface modification would produce FSN best suited for fingerprint analysis.

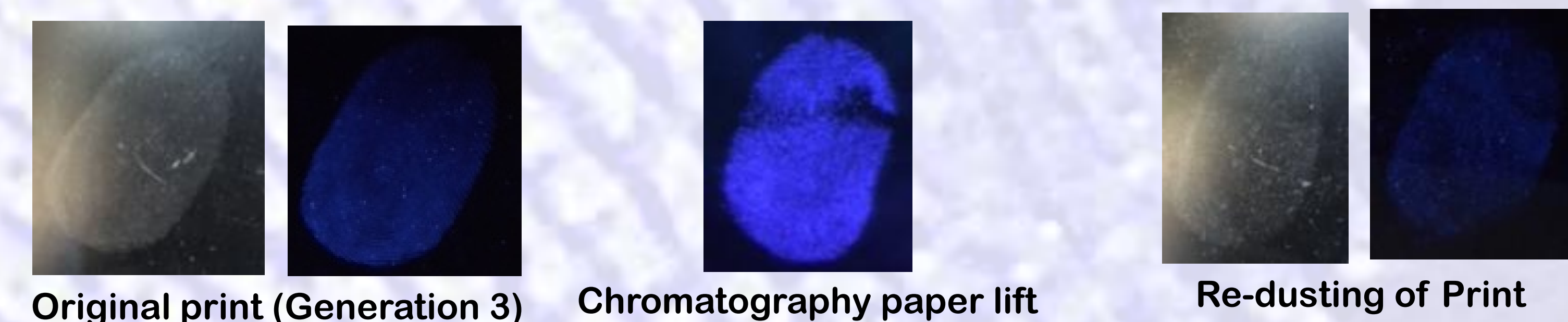
Glue Fuming Enhancement

Prints dusted with Generation 3 FSN were much more visible and detailed than prints that were not dusted with FSN after glue fuming.



Lifting Techniques

Fingerprints developed using FSN lose detail when lifted with traditional hinge lift techniques (not shown). Therefore, a method to lift fingerprints onto chromatography paper was developed. FSN prints are able to be lifted onto chromatography paper wetted with a surfactant solution. Once lifted, the prints can be re-dusted and visualized on the original surface.



CONCLUSIONS

- Modified FSN are able to generate latent fingerprints that are more visible and have greater detail than unmodified FSN.
- FSN enhance fingerprint glue fuming analysis
- A method to lift FSN-dusted prints onto chromatography paper was developed

ACKNOWLEDGEMENTS

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