UNIVERSITY OF AMSTERDAM





FORENSIC LITERATURE THESIS

LITERATURE THESIS

Title	: *Development of latent fingermarks using photoluminescent lead detection*
Keywords	: Forensic Dactyloscopy
Forensic Expertise Area	: Dactyloscopy
Department	: Biomedical Engineering & Physics
Institute/Company	: Amsterdam UMC, location AMC/ AMOLF institute
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UVA Examiner	: Maurice Aalders
UVA Coordinator	: Arian van Asten/Yorike Hartman

SHORT DESCRIPTION

People have long recognized fingerprints as a unique and enduring form of biometric identification. The distinct ridges, furrows, and minutiae patterns found on the fingertips of every individual have been instrumental in forensic science, law enforcement, and civil identification for over a century. Fingerprinting is often a cornerstone of criminal investigations, aiding in the identification and apprehension of suspects, as well as providing crucial evidence in courtrooms around the world. Latent fingerprinting techniques are the methods used to provide crucial biometric identification of suspects at a crime scene. The efficacy of techniques can be influenced by various factors, including the nature of the surface, environmental conditions, and the quality of latent prints. Considering these factors, research into alternative fingerprinting methods, such as Lead halide perovskite (Pb-PL) detection, shows potential for its forensic application as an alternative to current techniques. Lead halide perovskite semiconductors (Pb-PL) have recently shown extreme sensitivity to lead, thus demonstrating potential and utility within a forensic context. This highly sensitive, chemoselective, and quick acting lead detection reagent grants immediate lead feedback during an investigation. In a preliminary study PB-PL reagent was used to develop latent fingermarks, promising results were obtained, but to explore the full strengths of this new method, additional research is needed.
In this project, the advantages and disadvantages of using PB-PL reagents as a development technique for fingermark visualization will be further explored.

This project is part of the LEAD-DUST project (initiated by the AMOLF institute, in close collaboration with PhD student Kendra Adelberg), which is part of a large consortium composed of different partners working within the (forensic) work field.

REFERENCES

1) Jung, Hak-Sung, et al. "Dual-Emissive Mn-Doped Lead Halide Perovskite Nanocrystals as Background-Suppressed Latent Fingerprint Detection Probes." ACS Applied Materials & Interfaces 15.44 (2023): 51593-51605.

2) Jung, Hak-Sung, Junsang Cho, and Keir C. Neuman. "Highly stable cesium lead bromide perovskite nanocrystals for ultra-sensitive and selective latent fingerprint detection." Analytica chimica acta 1181 (2021): 338850.

REQUIRED/RECOMMENDED EXPERTISE

We are looking for a master student with a biomedical- or chemistry background. It is required that the student can work with human material. Experience with spectroscopic analysis is beneficial, but further training can be offered.