Characterisation and computational analysis of a novel lipase nanobio-based reagent for visualising latent fingerprints on water-immersed glass slides

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Abstract

Considering the significant evidential values of fingerprints in underwater criminal investigations and the need to visualise them using a user- and environmentally-friendly reagent, development of a novel, rapid and relatively greener nanobio-based reagent (NBR) is deemed beneficial. Lipase from the commercial Candida rugosa immobilised onto acid-functionalised multi-walled carbon nanotubes (NBR) was used as the safer and cheap lipid-sensing reagent to visualise groomed whole/split fingerprints on non-porous objects immersed in stagnant tap water for up to 30 days under a laboratory-controlled setting. Attenuated Total Reflectance - Fourier Transform Spectrometry, Field Emission Scanning Electron Microscopy and bioinformatics (molecular docking and molecular dynamics simulations) were employed to characterise and confirm the attachment of NBR onto the lipid constituents of wet fingerprints. Chromatographic results further confirmed the presence of n-hex-adecanoic and octadecanoic acids on fingerprints up to 30 days of immersion. Thus, NBR may potentially be useful as the future state-of-the-art fingerprint visualisation technology.

Keywords

Author Keywords: Latent fingerprint; Nanobio-based reagent; Candida rugosa lipase; Bioinformatics; Forensic science
KeyWords Plus: CANDIDA-RUGOSA LIPASE; FINGERMARK RESIDUE; ADSORPTION; DOCKING; ESTER

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