

Luminescent calcium phosphate nanoparticles for fingerprint imaging: Structural properties and *in vitro* cytotoxicity assay

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Fingerprint analysis is one of the most explored biometric recognition approaches in forensic science for personal identification. Usually, fingerprints left on surfaces cannot be observed by naked eyes, and a post processing step is often necessary, such as powder dusting and chemical fuming [1]. On the other hand, the use of photoluminescent nanoparticles (NPs) are gaining importance due to their resistance to photobleaching and the ability to produce high resolution and sensitive fingermarks when illuminated under UV radiation [2]. In this study, we propose the use of chemically precipitated, activators-free luminescent NPs [3], based on calcium orthophosphate (CaP) as a new material for fingerprint analysis. The CaP NPs were characterized by transmission electron microscopy (TEM), X-ray powder diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and X-ray photoelectron spectroscopy (XPS). When excited at $\lambda_{exc} = 405$ nm, the CaP NPs exhibited a defect-related broad band emission with the maximum centered at 522 nm, as determined by photoluminescence spectroscopy. Fingerprint images were obtained on the surface of tweezers and successfully validated by 3M Cogent CAFIS system used by Scientific Police in Spain. The potential *in vitro* cytotoxicity of the NPs was evaluated with cultures of Human Dermal Fibroblast neonatal (HDFn) cells via MTT assay. Cell viabilities superior to 95% were found in all concentrations of NPs, from 20 to 320 mg/mL, after incubation for 24h and 48h. The present results evidence the potential of the luminescent CaP NPs to be used as safe material for forensics purposes.

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References

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