Questioned document examination using optical coherence tomography

Manuel J. Marques[1*], Sandro Oliveira[1,2], Simon Clement[3], Carlos Marques[2],
Robert Green[4], Adrian Podoleanu[1]

[1] Applied Optics Group, School of Physics and Astronomy, Division of Natural Sciences, University of Kent, Canterbury CT2 7NH, Kent, United Kingdom
[2] CICECO – Aveiro Institute of Materials, Physics Department, Universidade de Aveiro, 3810-193 Aveiro, Portugal
[3] Foster and Freeman Ltd, Vale Park, 2 Vale Link, Evesham WR11 1TD, United Kingdom
[4] School of Chemistry and Forensic Sciences, Division of Natural Sciences, University of Kent, Canterbury CT2 7NH, Kent, United Kingdom
*Corresponding author: M.J.Marques@kent.ac.uk

ABSTRACT

The ability to distinguish legitimate from counterfeit documents, with high throughput, sensitivity, and selectivity is an ever-evolving challenge, particularly in high-stakes situations such as international border crossings. Over the last decade, an increasing number of security features have been introduced by authorities in identification documents.
The latest generation of travel documents (such as passports and national ID cards, but equally photocard driving licences) forego paper substrates for several layers of polycarbonate, which allow security features to be embedded within the document. These security features may contain information at either the superficial and sub-surface levels, thus increasing the document's resilience to counterfeiting. As the documents become harder to forge, so does the sophistication of forgery detection. There appears to be an unmet and evolving need to identify (and classify) such sophisticated forgeries, in a non-destructive, high throughput manner.

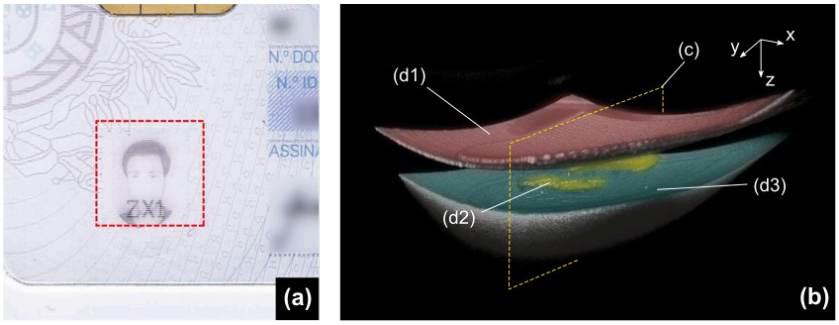

Figure 1: OCT imaging of security feature from Portuguese national ID card; (a) approximate location of scan; (b) 3-D rendered volume of the sub-surface structure of the security feature.

In this communication, building on a prior publication from our group [1], we present the application of optical coherence tomography (OCT) imaging on assessing security features in specimen passports, national ID cards and driving licences, including some confirmed counterfeited documents. OCT allows sub-surface imaging of translucent structures, non-destructively enabling quantitative visualisation of embedded security features, and providing their location in three-dimensional space.

Keywords: low-coherence imaging, non-destructive imaging, forensic sciences, questioned document examination, identification documents

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References:
[1] M. J. Marques, R. Green, R. King, S. Clement, P. Hallett, and A. Podoleanu, 'Sub-surface characterisation of latest-generation identification documents using optical coherence tomography', *Science & Justice*, p. S1355030620303336, Dec. 2020, doi: 10.1016/j.scijus.2020.12.001.