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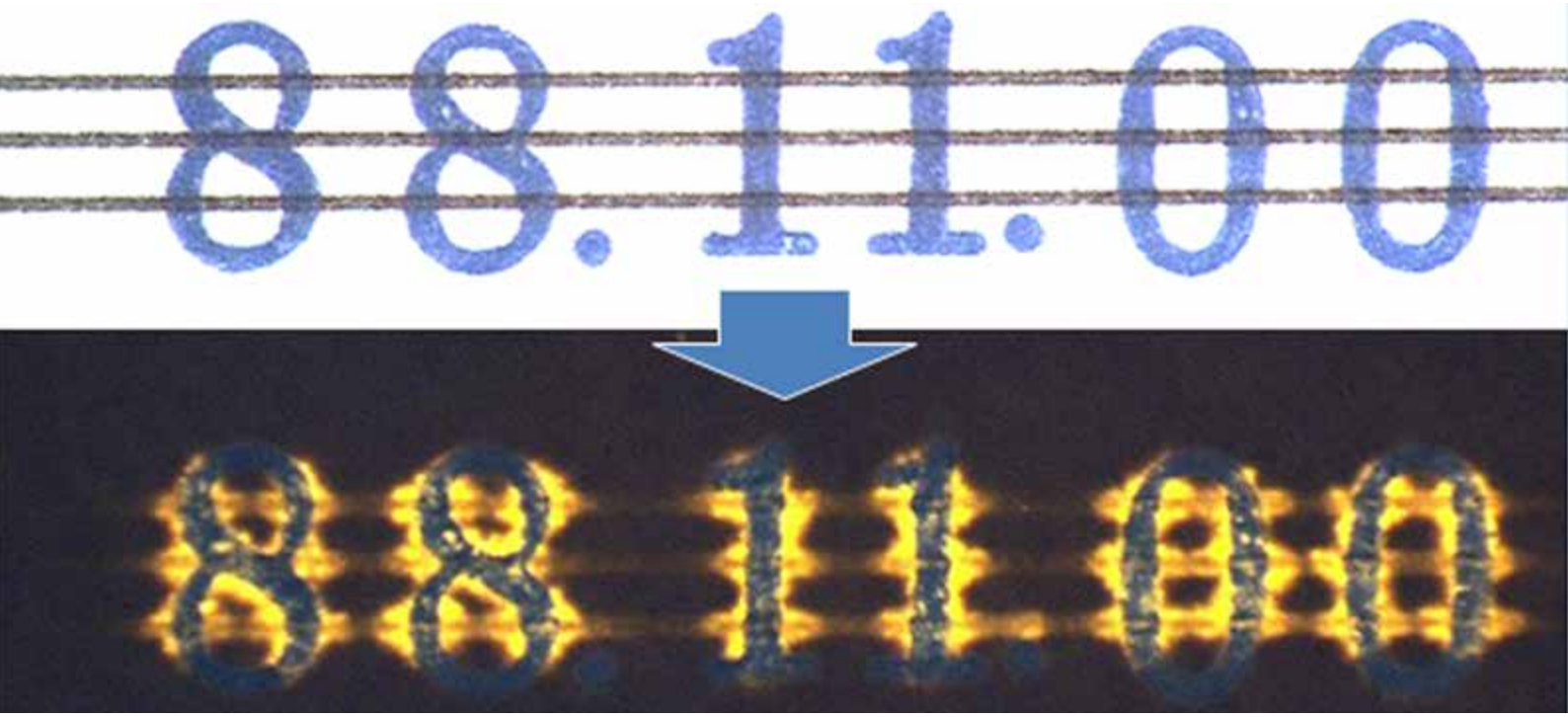

Physical-Chemical Study of Crossed Line Intersection

A project to develop a new forensic protocol for document examination

Coordinated by INTERPOL, this international research project examines microscopic differences in written works and ink age in order to identify if, how and when a document was forged or falsified. Even the smallest detail can have significant consequences in an investigation.

The project uses newly developed techniques to examine where two lines cross in written works, in order to identify any 'physical' differences, such as visible and invisible migration of inks, or differences in the 'chemistry', or the chemical composition of inks.

Following thousands of experiments, it was determined that ink used at different time intervals will react differently when examined under certain conditions.

The project proposes a methodology which will enable investigators around the world to conduct examinations at a globally accepted standard.

This new approach is aimed at assisting criminal investigations into the age-old problem of forgery, such as the falsification of identity documents, wills, or even suicide notes, where previous chemical-based techniques often resulted in the destruction of the evidence.

This project is part of INTERPOL's ongoing commitment to work with member countries and specialist organizations to identify and develop tools which will provide added value to national and international investigations.

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PHYSICAL-CHEMICAL STUDY OF CROSSED LINE INTERSECTION

▶ *THE HYPOTHESES OF THE PROJECT*

Having participated in a number of workshops, study visits and Working Group meetings, experts proved two out of the three hypotheses of the project.

- Hypothesis 1 (chemical and physical reactions which will depend on the quality of the inks used);
- Hypothesis 2 (evidence of the order of inscription of each line).

The third hypothesis (evidence of the time separating the execution of the two lines) has been split into four protocols which were tested over a number of years by experts and which have been validated today.

▶ *SCIENTIFIC PROTOCOLS*

Protocol A: Ink dating study: measuring the non-visible migration, provides the answer of whether or not non-visible ink migration can be used for ink dating.

Protocol B: DT STUDY I: measuring the visible migration assesses the question of whether or not visible ink migration can be used for ink dating or determination of Dt.

Protocol C: DT STUDY II: measuring the luminescence intensity in cli, answers the question whether or not fading of luminescence can be used to determine Dt.

Protocol D: CHEMICAL STUDY: chemical analysis of ink components aims to identify the chemical compounds of inks, in particular luminescent compounds present in inks.

▶ *CONDITIONS*

Whether or not this method can be applied for ink dating (or intersection dating), depends on the inks, the ink combination and the paper used. In order for a document to be potentially suitable for ink dating studies, the following conditions have to be fulfilled:

- Ink must contain at least one luminescent component;
- This component must diffuse either into the paper or in the direction of the intersecting line;
- The paper must not quench (or absorb) the luminescence of this component;
- The paper (or the primary line) must not show the same luminescence as this component. In other words, there must be a setting on the detection unit (excitation and detection wavelengths) producing enough strong luminescence difference between the migrating component(s) and the background.

▶ *INTERNATIONAL COOPERATION*

We express our gratitude to the 120 forensic document examiners from 54 INTERPOL member countries who have participated in this project.

The project is developed by INTERPOL in partnership with International Academy for Handwriting and Documents (L'Académie Internationale des Experts en Ecriture et Documents – AIEED).

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