

Use of Scanning as a Complementary Method for Forensic Document Expertise

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Scanning has many applications in the study of biological and material samples [1,2,3,4,5]. Public and private documents are liable to be altered by different methods. To detect fraudulent alterations several techniques are used, such as, visual, chemical and comparison techniques, as well as a series of different and complementary methods of expertise. The aim of this work was to determine differences between three types of printing on paper. The evaluated methods were printing with inkjet printer, toner and photocopy using optical and scanning electron microscopy techniques. The samples were observed with Leica DM500 and images were taken with Leica ICC50 W. Samples were mounted on aluminium sheets bonded with two-sided tape and then coated with gold using a sputter coater Denton Vacuum Desk II. Observations were made with a JEOL 5800LV SEM equipment. The following working conditions were employed: - high vacuum, -electrons acceleration voltage 15KV, -working distance 20 mm, - digital images were captured at different magnifications.

The conducted study allows us to arrive to the following preliminary conclusions: prints that involve heat: laser printer (sample 4), toner (sample 6), laser colour photocopy (sample 8) and laser B&W printer (sample 11), had an effect on the papers' fibres, leaving an impression seen on the SEM. On the other hand, samples printed with the inkjet printer (sample 5, 9) had no effect on the fibres, except for sample 7 where a slight impression was seen. A similar result was seen on the offset paper, in which the impression was made by transference.

Significant differences were observed between the three printing types. The application of scanning observation techniques allows determining the type of printing made on paper, which means, this technique can be used in forensic expertise to recognize fraudulent alterations of public documents in the area of Documentology.

More studies are required in order to determine if this complimentary method is reliable and chromatographic analysis can be made to observe ink's components (e.g. establish a comparison between alternative and original ink). Finally, scanning observation techniques are complimentary to optical microscope analysis techniques allowing the expert to complete the analysis of the document under review [8].

References

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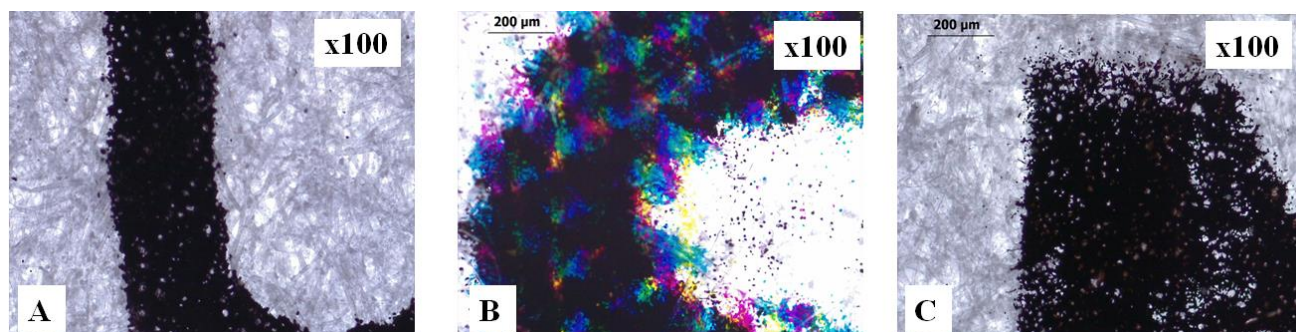


Figure 1. Optical microscope. Images of prints with: A, toner dust laser printer (sample 4). B, laser colour photocopy (sample 8). C, inkjet B&W printer (sample 11).

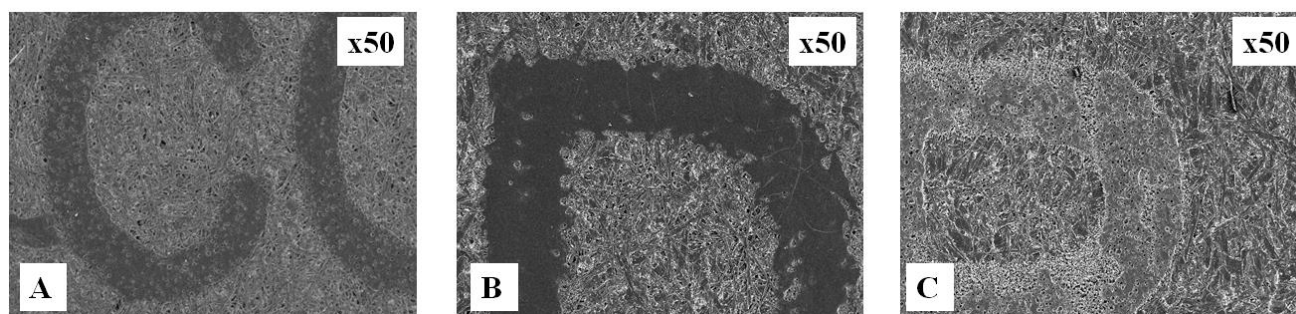


Figure 2. Scanning electron microscope. Images of prints with: A, toner dust laser printer (sample 4). B, laser colour photocopy (sample 8). C, inkjet B&W printer (sample 11).