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Design of a Novel Nitrogen Dioxide Method for Visualization of Latent Fingerprints on Thermal Paper

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Thermal paper is widely used for printing bills, ATM slips, invoices, receipts, tickets and etc. Actually, this material presents a paper which is one-side coated with thin layer (i.e thermal layer) that contains leuco dyes, developers, and solvents with low melting point (45-65 °C). The printing process on this kind of paper is achieved by applying heat on its surface that leads to slight melting of the solid solvent which allows contact between the components from the thermal layer thus inducing color change.

A new chemical method for visualization of latent fingerprints on thermal paper based on treatment with nitrogen dioxide (NO₂) gas is presented in this work. The gas is generated by reaction between zinc and diluted nitric acid in a simple chamber. The proposed method does not require fingerprint's fixation reagent (post-treatment) i.e. the fingerprint remain permanent for more than one week, without any changes in its quality. The general visualization mechanism is based on providing acidic conditions in order to induce tautomeric transformation of the leuco dye's molecules in the thermal layer, accompanied with color change of the papillary lines through the completely impressed fingerprint. This method provides more than satisfactory contrast between the visualized fingerprints and the background surface. The visualized fingerprints are qualified with high clarity and continuity of the friction ridges, and also clarity of the second level characteristics and third level features. The method was evaluated by dactyloscopic analysis and according to the results, it can be exemplified with high identification capacity.

Biography

Sasho Stojkovikj has completed his BSc and MSc degrees from the Institute of Chemistry, Faculty of Natural Sciences and Mathematics, Ss Cyril and Methodius University in Skopje, Republic of Macedonia. He is a PhD student at the Freie Universität in Berlin, Germany and Scientific Associate in Helmholtz Zentrum Berlin für Materialien und Energie, working on Electrochemical conversion of carbon dioxide. He has published 4 papers in the field of material science, 2 papers in educational chemistry and one paper in the field of forensic sciences (design of chemical methods for visualization of latent fingerprints on cartridge cases).