



J14 Infrared (IR) Luminescence With Different Paper Substrates

Dennis J. Ryan, MBA, Applied Forensics LLC, East Meadow, NY 11554*

Learning Overview: The goal of this presentation is to determine if different paper substrates have any effect on the visualization of luminescent pen inks.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating how an examiner must be cautious in drawing any conclusions when different paper substrates are involved.

The paper substrate variables included brightness, weight, brand, and type of paper. The preliminary research determined that there was a significant variability within one level of brightness (92, 98, 102, etc.), so the research was predominately restricted to only 98 brightness paper. Eighteen different pens were used with numerous different paper substrates. Individual pieces of 98 brightness paper was used. These pieces varied by weight, type, and brand. The size of the piece of paper remained constant. One straight ink line was drawn with 18 different pens of varying colors and types. Each pen used was known to have ink with luminescent properties. The different pens were broken down into 3 rollerballs, 2 fountain pens, 1 felt tip, 11 ballpoints, and 2 gel pens. This study used the following 98 brightness papers: four color copy papers, seven multipurpose papers, six laser papers, and one inkjet paper. A Foster & Freeman Video Spectral Comparator (VSC) 40/HD was used to detect the IR luminescent properties of the different pens. Eighteen pens were used, but data was analyzed for only 17 pens; one of the pens ran out of ink. Significant variations were seen when comparing multipurpose to color copy paper.

Caution should be exercised when examining the IR luminescent properties of inks over different substrates. The findings showed that the type of paper may have a significant effect on the visualization of luminescent inks. Inks luminesced at lower wavelengths on laser and color copy papers than the same ink on multipurpose papers. No correlation could be made between paper weight and ink luminescence because no consistent pattern was observed. No one brand of paper consistently affected the visualization of the luminescence. Erroneous conclusions may be reached when examining inks over different paper substrates (i.e., unlined white paper enclosed in a white envelope).

Some preliminary results were obtained from 96 brightness white paper, 100 brightness, and color copy paper. The results from the 96 brightness paper was consistent, if not identical, to the results found to the same type and weight. Some pens luminesced under slightly lower wavelengths on laser and color copy paper on the 96 brightness paper. The results for the 100 brightness papers was less conclusive because there were as many different paper substrates on the commercial market as there is in the 96 and 98 brightness range.

IR Luminescence, Ink Examination, Paper Substrate