Carbon Dot and Cyanoacrylate Fuming Method for Latent Fingerprint Detection

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From helping solve mass murder cases to low level crimes, fingerprints are an invaluable forensic tool. Improving the current methods of fingerprint detection is important to help increase the validity of fingerprints in trial and expedite the hearing process. This project sought to create a new method of fingerprint analysis using carbon dots, a relatively new carbon nanomaterial, and cyanoacrylate fuming to produce higher quality florescent prints. Three trials were done to gather the fingerprints - one with just cyanoacrylate fuming treated with a florescent spray after (control group 1), one with just a carbon dot powder (control group 2), and one with carbon dots applied before fuming (experimental group). The carbon dot prints were then viewed under three different wavelengths (625nm, 530nm, & 465nm), while control group 1 was viewed under a black light (365nm). The prints were analyzed using the FpMV (Fingerprint Minutiae Viewer BETA 3.0) program which gave the number of visible minutiae and NFIQ (fingerprint image quality) score of each print. The results between the cyanoacrylate and novel prints were statistically significant, finding that the experimental prints produced more minutiae on average with a P value of 0.002573 under a two tailed T-test assuming unequal variances. While the difference between the experimental prints and the control group 2 or carbon dot dusted prints wasn't statistically significant, there were still about 13 more visible minutiae on average, which is noteworthy as forensic scientists look for at least 12-20 matching minutiae.

Awards Won:

National Security Agency Research Directorate : First Place Award "Material Science"