



### A190 Electrostatic Lifting-Coupled With Nanomanipulation-Electrospray Ionization for the Analysis of Illicit Drugs

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The goal of this presentation is to address a method of lifting drug residues that comes from a common technique used to lift dust prints at crime scenes and coupling it with nanomanipulation-nanospray ionization instrumentation. From this distinct combined method, it will be shown how increased sensitivity of analysis and lower limits of detection for drug analysis can be achieved with ease and efficiency of this two-part method. The principles of electrostatic dust lifting can be applied to lifting different types of drug residues on various surfaces. Nanomanipulation-coupled to nanospray ionization instrumentation has been used in the analysis of multiple solution mixtures and is known to be a very sensitive technique.

This presentation will impact the forensic science community by discussing how the standard limits of detection for most types of drug analysis can be improved with this proposed method of electrostatic drug lifting and nanomanipulation-nanospray ionization by bringing the analyzing capillary tip to the sample, as opposed to preparing the sample and bringing it to the tip.

In most cases, many illegal drugs are in the physical form of dust particles when found at crime scenes. Investigators often have to gather the amount they find at these crime scenes and send it to the laboratory for analysis. There are often times when there is not enough to send to the laboratory since there may be too small of amounts to gather or the crime scene has been cleaned. There are standard limits of detection with various types of drug analysis that laboratory personnel will follow when doing drug analysis, and so extremely small amounts cannot always be detected.

With that fact in mind, the introduction of this unique method will show how drug residues can be lifted with the electrostatic dust lifter and then analyzed with nanomanipulation-nanospray ionization mass spectrometry. Drug residues that are lifted from crime scenes with the electrostatic dust lifter can be detected and verified in amounts normally not considered enough for standard limits of detection. The metallic film that the drug is lifted on serves as a great platform to dissolve the drug residue with a prepared solvent. The dissolved drug can then be withdrawn into the nanospray capillary so that analysis can be performed. Nanomanipulation-nanospray ionization is a method that provides greater sensitivity to trace analysis work. Extremely small sample amounts of compounds (nanoliter to picoliter amounts) can be detected with efficiency and ease. The technique is very direct in that the drug residue is dissolved with a prepared solvent and withdrawn into the nanospray capillary for nanospray ionization by the mass spectrometer. Single crystal extraction produces ample signal for this sensitive technique. The drug residues on the film can also be magnified under a microscope before analysis is performed to verify that there are suspected drug residues present.

The intent is to demonstrate how effective this two-part method is for lifting drugs off of various surfaces and objects and to show how well it may facilitate drug analysis in the laboratory. Various types of drug standards will be analyzed in the current methodology and compared with

the analyses of drugs lifted onto the metallic film. The technique as well as the procedure utilized will be explained at length according to the best practice implemented throughout the experiment. **Electrostatic Lifts, Illicit Drug, Nanomanipulation**