

LOCALIZING CHEMICAL AND BIOLOGICAL THREAT DETECTION

Assessment Of Surface And Ground Hazards By Real-time Detection (ASGARD): Deposition Methodology Development And Characterization

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This work presents the effort done for using inkjet printing technologies and methodologies in support of the Assessment of Surface and Ground hazards by real-time Detection (ASGARD). Inkjet printing for Line Of Effort (LOE) 1 – Surface Deposition Development and Characterization LOE 1 is broken down to two tasks:

Task 1.1 Acquisition of the Direct Color Systems 1800Z industrial flatbed printer, construction of a printer containment chamber for the 1800z and the acquisition of the GeSiM NP 2.1 Nanoplotter microarray printer.

Task 1.2 Characterization of the Direct Color Systems 1800z and the GeSiM NP 2.1 Nanoplotter.

For Task 1.1, the Direct Color Systems (DCS) 1800Z industrial flatbed printer and GeSiM NP 2.1 Nanoplotter micro array printer were successfully acquired. Modifications were made to both systems to allow operational compatibility with the materials to be printed. For the DCS printer, a custom designed chamber was constructed to house the system to ensure the safety of the operator and provide effective containment of the materials during operation. The Nanoplotter has been installed on a built-in-house table inside a hood. Both systems are fully operational, preliminary characterization trials being performed on both systems, using various materials and substrates for Task 1.2.

Task 1.2 activities focus on the printing characteristics of the DCS 1800Z printer and the GeSiM Nanoplotter using various materials of interest. Characterization of samples produced by the inkjet depositing will include but not limited to:

- Material compatibility and reduction of consumption of material needed.
- Surface coverage, areal density.
- Pattern efficiency.
- Chemical integrity.

Samples will be characterized using Raman Chemical Imaging (RCI), high-performance liquid chromatography (HPLC) and mass spectrometry (HPLC-MS) and/or Gas chromatography–mass spectrometry (GCMS).

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