

# Ambient Ionization Mass Spectrometry for Simultaneous Analysis of Organic and Inorganic Radiological Dispersion Device (RDD) Components

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Radiological dispersion devices (RDDs) consist of inorganic (radionuclides) and organic (explosive) components. Field-portable ambient ionization techniques that are capable of conducting simultaneous molecular and elemental analysis of RDDs are desired for post-detonation forensic analysis. To this end, desorption electrospray ionization (DESI) and laser ionization (LI) sources were coupled to a linear ion trap mass spectrometer. Preliminary data using DESI-MS confirms that explosive compounds such as RDX can be detected as well as soluble metal salts like CsCl. Source collision induced dissociation (CID) was used to enhance the signal of the metal salts by breaking up adducts and to reduce chemical noise by fragmenting organic components. Laser ionization coupled with mass spectrometry (LI-MS) was capable of ionizing solid metals (e.g., Lead and Cobalt) and refractory materials (e.g., Strontium titanate). Because DESI, LI, and ion traps are all readily fieldable technologies, the fusion of these techniques is promising for building portable, “universal” mass spectrometers capable of simultaneous organic, inorganic, elemental, and isotopic analysis in the field.