

Detection of "Unknown Agents" in Harsh Environments Using a Newly Developed Ruggedized Mass Spectrometer

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Abstract Submission

3rd Workshop on Harsh-Environment Mass Spectrometry and 2nd NASA/JPL Miniature Pumps Workshop

March 25-28, 2002

Submission Deadline: December 15, 2001

500 words or less, in English only.

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I am submitting an abstract for the: Harsh-Environment Mass Spectrometry Workshop
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 Presented talk Poster

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Abstract (500 words or less):

A new, ruggedized and integrated detection system for chemical and biological agents has been developed for use in field analysis. The analyzer employed in this instrument is a custom designed ion trap mass spectrometer capable of using air as the buffer gas with complete electronic control and offline data analysis software. System components have been selected for radiation tolerance and special circumvention circuits were designed to rapidly de-power the system upon detection of a nuclear event. The vacuum system includes a turbo pump that was tested to ensure it could operate without failure when exposed to vibrations and sudden changes in orientation that might be generated by the target vehicle platforms. The additional pumping speed obtained using this pumping strategy not only permits the system to clear itself more quickly than previous systems that were based on ion getter pumps but also allows the system to use chemical ionization reagents to increase chemical selectivity. The instrument is equipped with a mode-select valve to provide rapid selection of one of three sampling systems: a vapor detection line for volatile chemical agents, a ground sampling system for liquid chemical agents and a unique aerosol concentrator / pyrolysis system for biological agents.

The primary focus of this work has been the development of highly specific and reliable detection schemes for the most likely threat agents. Also of concern are agents that have not been prioritized and may include new designer agents that have been

chemically modified from those typically found in the inventories of armies around the world. Additionally, toxic industrial chemicals that may be released during the course of a battle represent a potential chemical threat to soldiers in the field. This presentation will focus on the development of this instrument as a rugged chemical and biological agent detector and discuss its application to the problem of detection of "unknown" chemical agents in harsh environments.