**ABSTRACT**

Ion mobility spectrometry (IMS) is a separation technique that adds a new dimension to mass spectrometry. Gas phase IMS is being used successfully for various monitoring and detection purposes related to public safety. However, the separation efficiency of gas phase IMS suffers as the instrument is scaled down. To eliminate this problem we have been working on substituting the gas medium with a liquid medium due to the fact that ions diffuse 2-3000 times slower in liquids than in gases [1]. Therefore, a micro-scale liquid phase IMS can provide real-time analysis with high separation efficiency. In this presentation we show some results of detecting ions from methanol-water solution by our miniaturized, handheld device.

**INTRODUCTION**

IMS is a separation technique for analyzing and detecting a wide variety of chemical compounds. It separates ions according to their size-to-charge ratio in an electric field. In the early 1970s, interest in IMS blossomed because of its analytical versatility, excellent detection limits, fast response (in millisecond time scale), suitability for real-time monitoring, and low cost.

Gas phase IMS systems are now employed in airport security, site security, drug interdiction, forensics, and customs [3]. It is the method of choice for the detection and monitoring of narcotics, illicit drugs, and explosives. IMS technique is also being extensively used for air quality monitoring and for military applications, especially for detection of chemical and biological warfare agents.

**THEORY OF ION MOBILITY SPECTROMETRY**

Ion mobility spectrometry (IMS) is a separation technique that adds a new dimension to mass spectrometry. Gas phase IMS is being used successfully for various monitoring and detection purposes related to public safety. However, the separation efficiency of gas phase IMS suffers as the instrument is scaled down. To eliminate this problem we have been working on substituting the gas medium with a liquid medium due to the fact that ions diffuse 2-3000 times slower in liquids than in gases [1]. Therefore, a micro-scale liquid phase IMS can provide real-time analysis with high separation efficiency. In this presentation we show some results of detecting ions from methanol-water solution by our miniaturized, handheld device.

**FABRICATION OF THE MICROCHIP**

This microfluidic chip will have a broad range of applications from real-time explosives, hazardous molecules, and chemical warfare agent detection to monitoring environmental and bio-molecules on a routine basis.

**RESULTS**

**CONCLUSION**

- We developed a novel platinum microelectrode fabrication technique in the PDMS based microfluidic channel, which enabled us to fabricate an state-of-the-art polymeric based microfluidic device.
- We were also able to ionize the sample and detect ions in our system.

**REFERENCE**


**ACKNOWLEDGEMENT**

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- School of Mechanical and Materials Engineering, WSU
- Department of Chemistry, WSU
- Phillip D. Hayenga

**EXPERIMENTAL SETUP**

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