Ion Generation by Electrospray Using Wetted Porous Material

**Track Code:** 65345

**Categories:**
- Chemical Engineering
- Chemistry and Chemical Analysis

**Keywords:**
- Chemical Engineering
- Chemistry and Chemical Analysis
- Mass Spectrometry

Electrospray ionization is regarded as the best characterized and most efficient method for ionization of molecules in solution phase. There are three main stages in the process: droplet formation, droplet evaporation, and ion formation. When a strong electric field is applied, a cone forms and a mist of small droplets is emitted from the tip. This method can produce small, charged droplets under a low flow rate; however, the small size of the tip and the materials used cause problems with the source, which results in the tip easily becoming damaged or clogged. Other methods for overcoming clogging have been developed, but these methods still only work for pure chemicals dissolved in solution.

Purdue University researchers have developed a method that can combine the sample pretreatment and ionization process to reduce the complexity of the device and make it more efficient. This paper method has many benefits that will address the problem of sample introduction in mass analyzers and accelerate the application of miniature spectrometers in situ analysis.

**Advantages:**
- Few other things required for in situ analysis
- Biological samples can be stored in the precut filter papers for months
- Filter paper minimizes matrix effects and enhances the MS signal of chemicals in complex samples
- Powdered samples can be directly applied to the paper and then analyzed without requiring pretreatment
- Paper can be pretreated to contain internal standards that are released at certain points in quantitative analysis

**Potential Applications:**
- Chemical Analysis
People:
- Cooks, Robert Graham (Project leader)
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- Manicke, Nicholas E
- Ouyang, Zheng
- Wang, He

Intellectual Property:

Application Date: January 19, 2016  
Type: NATL-Patent  
Country of Filing: European Patent  
Patent Number: 3014647  
Issue Date: December 19, 2018

Application Date: April 29, 2010  
Type: NATL-Patent  
Country of Filing: Canada  
Patent Number: 2,759,987  
Issue Date: October 2, 2018

Application Date: April 10, 2017  
Type: CON-Patent  
Country of Filing: United States  
Patent Number: 9,941,105  
Issue Date: April 10, 2018

Application Date: March 4, 2013  
Type: CIP-Patent  
Country of Filing: United States  
Patent Number: 9,500,572  
Issue Date: November 22, 2016

Application Date: April 29, 2010  
Type: DIV-Patent  
Country of Filing: Singapore  
Patent Number: 10201401521U  
Issue Date: November 2, 2016

Application Date: April 29, 2010  
Type: NATL-Patent  
Country of Filing: China  
Patent Number: 201080019239.3  
Issue Date: March 16, 2016

Application Date: December 5, 2014  
Type: CON-Patent
Country of Filing: United States  
Patent Number: 9,116,154  
Issue Date: August 25, 2015

Application Date: January 12, 2015  
Type: CON-Patent  
Country of Filing: United States  
Patent Number: 9,035,239  
Issue Date: May 19, 2015

Application Date: September 9, 2014  
Type: CON-Patent  
Country of Filing: United States  
Patent Number: 8,937,288  
Issue Date: January 20, 2015

Application Date: September 12, 2013  
Type: CON-Patent  
Country of Filing: United States  
Patent Number: 8,933,398  
Issue Date: January 13, 2015

Application Date: April 29, 2010  
Type: NATL-Patent  
Country of Filing: Japan  
Patent Number: 5671523  
Issue Date: December 26, 2014

Application Date: December 26, 2012  
Type: CON-Patent  
Country of Filing: United States  
Patent Number: 8,890,063  
Issue Date: November 18, 2014

Application Date: January 9, 2014  
Type: CON-Patent  
Country of Filing: United States  
Patent Number: 8,859,986  
Issue Date: October 14, 2014

Application Date: December 26, 2012  
Type: CON-Patent  
Country of Filing: United States  
Patent Number: 8,859,959  
Issue Date: October 14, 2014

Application Date: December 26, 2012  
Type: CON-Patent
**Country of Filing:** United States  
**Patent Number:** 8,859,958  
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**Type:** Utility Patent  
**Country of Filing:** United States  
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**Application Date:** April 29, 2010  
**Type:** NATL-Patent  
**Country of Filing:** Australia  
**Patent Number:** 2010-0241614  
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**Application Date:** September 11, 2013  
**Type:** CON-Patent  
**Country of Filing:** United States  
**Patent Number:** 8,816,275  
**Issue Date:** August 26, 2014

**Application Date:** November 26, 2013  
**Type:** Trademark  
**Country of Filing:** United States  
**Patent Number:** 4,563,866  
**Issue Date:** July 8, 2014

**Application Date:** May 2, 2014  
**Type:** Trademark  
**Country of Filing:** WO  
**Patent Number:** 1210100  
**Issue Date:** May 2, 2014

**Application Date:** September 11, 2013  
**Type:** CON-Patent  
**Country of Filing:** United States  
**Patent Number:** 8,710,437  
**Issue Date:** April 29, 2014

**Application Date:** June 25, 2013  
**Type:** CIP-Patent  
**Country of Filing:** United States  
**Patent Number:** 8,704,167  
**Issue Date:** April 22, 2014

**Application Date:** April 29, 2010  
**Type:** NATL-Patent
Country of Filing: New Zealand
Patent Number: 595809
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Application Date: December 28, 2018
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Country of Filing: China
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Country of Filing: WO
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Type: NATL-Patent
Country of Filing: European Patent
Patent Number: (None)
Issue Date: (None)

Application Date: April 29, 2010
Type: NATL-Patent
Country of Filing: India  
Patent Number: (None)  
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Type: NATL-Patent  
Country of Filing: Singapore  
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Type: NATL-Patent  
Country of Filing: South Korea  
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Country of Filing: Japan  
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Application Date: February 26, 2010  
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Country of Filing: United States  
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