

Mass Media

JEOL

Mass Spectrometry News and Applications
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Open Air Mass Spec Confirms Self-Assembled Monolayers (SAMs)



Florida Institute of Technology photo (left to right) Dr. Kafui Kpegba (Postdoctoral Researcher), Dr. Joel A. Olson, Dr. Nasri Nesnas, and undergraduate student Tycho Spadaro on the DART.

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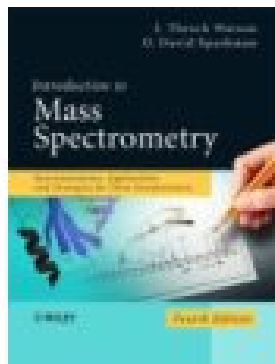
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In a [2007 Analytical Chemistry paper](#), Florida Institute of Technology researchers report their findings after using AccuTOF-DART open air mass spectrometry to analyze self-assembled monolayers (SAMs). "A SAM consists of a single layer of molecules chemically bonded to a surface; typically the surface is gold and the SAM molecules are thiols. SAMs chemically modify surfaces, which can be useful for applications such as sensor electrodes and photovoltaic cells," an article in FIT's 2007 Research News & Reports states. "In this work, a gold surface was treated with dodecanethiol and then analyzed using DART mass spectrometry. The mass spectrum shows peaks (with high resolution information) that confirm the identity of the molecules present at the surface. The remarkable nature of this technique stems from two factors - 1) The analysis is done on a single layer of molecules (roughly a nanogram of material); 2) a pattern of monomers, dimers and trimers is evidence that the material analyzed comes from the SAM."

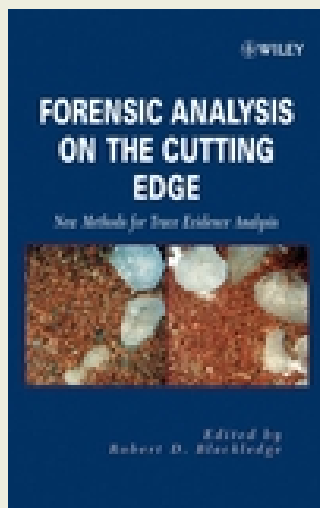
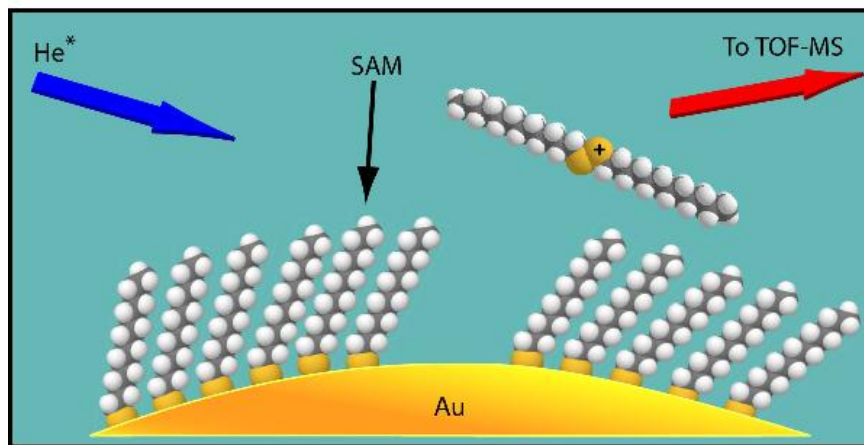
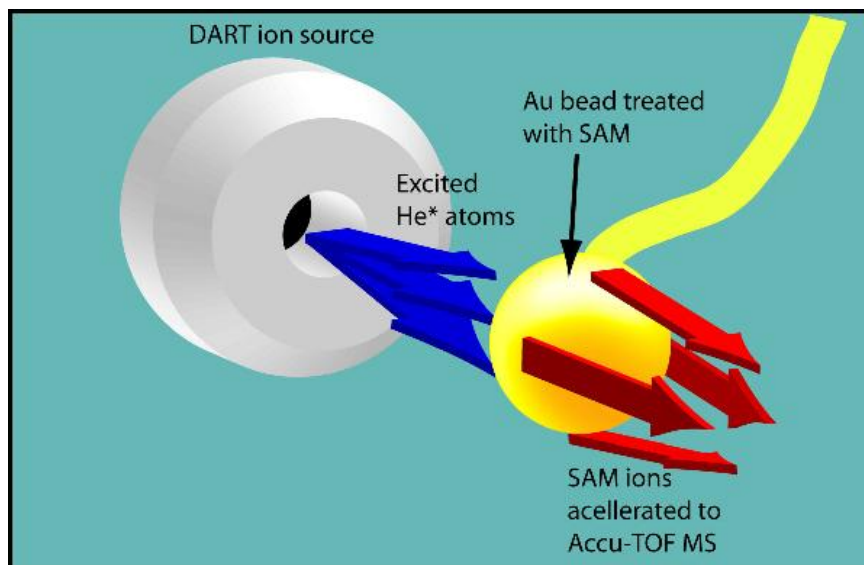
New Introduction to Mass Spectrometry



"This book should be on the bookshelf of every mass spectrometrists."

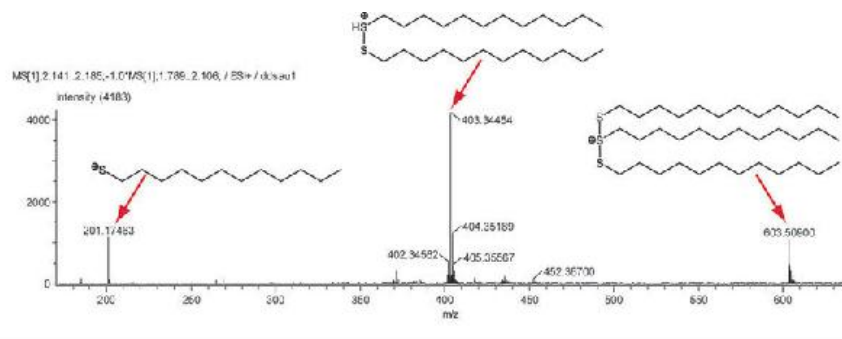
Just published, the fourth edition of *Introduction to Mass Spectrometry* is "the first book in recent years to facilitate an understanding of the operating principles of instrumentation and techniques including those for emerging technologies...."

Authors: J. Throck Watson and O. David Sparkman



Forensic Analysis on the Cutting Edge

A new book published by Wiley-Interscience features a chapter on the revolutionary use of Direct Analysis in Real Time (DART) mass spectrometry for forensics. Samples from the human body, including analysis of TATP on a fingertip, analysis of bodily fluids, drugs,



Work conducted in the labs of [Nasri Nesnas](#) and [Joel A. Olson](#) showed that open air analysis using the AccuTOF-DART, a significantly less expensive technique than Secondary Ion Mass Spectrometry (SIMS), "was unique in its nature and displayed unambiguous characterization of the molecules present at the gold surface."

The AccuTOF-DART will be used in organic chemistry classes and research at FIT, and may also be called upon for analysis to aid local law enforcement.

"We're pleased that the DART ion source and the AccuTOF-DART combination are being used for such a wide variety of applications, and being used in such novel techniques across the sciences.," says Dr. Robert (Chip) Cody, co-inventor of the DART ion source.

To access the ACS website and a pdf file of the paper "[Analysis of Self-Assembled Monolayers on Gold Surfaces Using Direct Analysis in Real Time Mass Spectrometry](#)," Kafui Kpegba, Tycho Spadaro, Robert B.

chemical warfare agents, arson accelerants, inks and adhesives are included.

Chapter 7. Forensic Application of DART (Direct Analysis in Real Time) Mass Spectrometry (James A. Laramée, Robert B. Cody, J. Michael Nilles, and H. Dupont Durst).

7.1 Introduction.

7.2 Experimental.

7.3 Drug and Pharmaceutical Analysis.

7.3.1 Confiscated Samples.

7.3.2 Endogenous Drugs.

7.3.3 Drug Residues on Surfaces.

7.4 Samples from the Human Body.

7.4.1 Fingerprints.

7.4.2 Bodily Fluids.

7.5 Condom Lubricants.

7.6 Dyes.

7.6.1 Self-Defense Sprays.

7.6.2 Currency-Pack Dye.

7.7 Explosives.

7.8 Arson Accelerants.

7.9 Chemical Warfare Agents.

7.10 Elevated-Temperature DART for Material Identification.

7.11 Glues.

7.12 Plastics.

7.13 Fibers.

7.14 Identification of Inks.

Cody, Nasri Nesnas, and Joel A. Olson, click [here](#).



Real Time Analysis of Cuticular Hydrocarbons

The fruit fly's wings pulsed rapidly, though she was stuck fast in the grasp of a gentle vacuum pick. [Harvard Medical School's Fruit Fly Fight Club](#)

researcher Joanne Yew carried her to the mass spectrometer, where her hydrocarbon profile

was instantly analyzed. She returned her to a container that held special food.

Experiments held at JEOL USA made it possible to use a new technique for analyzing hydrocarbons and other surface molecules from awake behaving animals. In this research, fruit fly behavior and pheromones are being studied for neurobiological purposes. The cuticular hydrocarbons were analyzed using the [AccuTOF-DART \(Direct Analysis in Real Time\) mass spectrometer](#).

*A new paper submitted for publication demonstrates applications for profiling individual *Drosophila melanogaster* and monitoring changes in hydrocarbon expression.*



"Forensic Analysis on the Cutting Edge - New Methods for Trace Evidence Analysis" - is available now from [Wiley](#) or other booksellers.

Visit JEOL at

[AAFS](#)

American Academy of Forensic Science Annual Meeting

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ASMS Fall Workshop 2007

The Art of Open Air Ionization on Surfaces

Chemical Heritage Foundation Philadelphia, PA

November 8 - 9, 2007

DART Presentations

"The Development of a Searchable Library for Direct Analysis Real Time (DART) Accurate Mass Spectra Data" - Lisa Schumacher, FBI Laboratories

"DESI and DART for Counterfeit Drug Fingerprinting" - Facundo M. Fernandez, Georgia Institute of Technology

"The Art of DART" R. Cody - JEOL USA

New Midwest Sales Manager Joins JEOL

We welcome a new sales representative to the JEOL USA family. Anthony (Tony) Borre of Waukegan, Illinois, is now the JEOL mass spectrometry liaison for the Midwest states.

Tony's background includes 8 years of organic synthesis/proprietary formulations/high pressure reactions (IR, TLC, and GC) and 24 years of analytical chemistry. He spent four of those years employing HPLC, electrochemistry, and AA methods development in support of hospital products, and another four years in HPLC methods development (UV, RI, and EC) in support of new drug discovery and pharmacology projects. His experience also includes 14 years of LC/MS/MS high throughput methods development in support of drug metabolism projects, and high efficiency sample preparation by ultracentrifugation, SPE, and robotic methods.

Tony's alma mater is the University of Wisconsin-Parkside. He and his wife of 31 years, Sheila, have a daughter who is a chemical engineer, and a son who is a police officer. They now share their home with a Boston Terrier and a cat.



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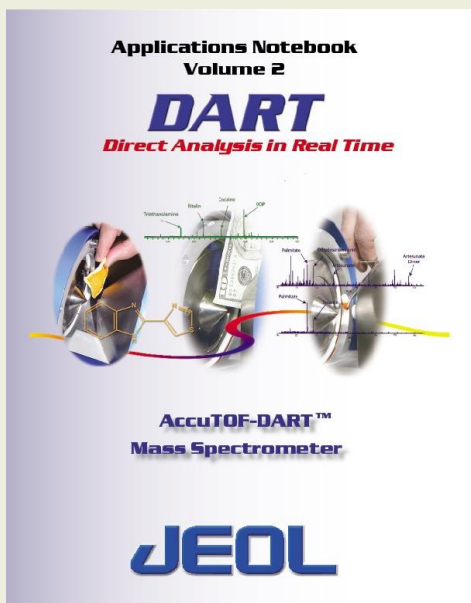


Tutorials and Applications Notes

Bookmark www.jeolusa.com for complete access to useful mass spec [Tutorials](#) and [applications notes](#).

The tutorials have been updated and include useful reference tables for day-to-day DART operation.

We continually add to our applications notes.



To Download the Third Edition of

Published Papers on DART Direct Analysis in Real Time

In the three years since DART, the open air ion source that revolutionized mass spectrometry, has been in production, numerous presentations and papers have been given by our customers, as well as ourselves.

Below is the most recent bibliography of peer-reviewed journal or book publications:

General

Cody, Robert B., Laramée, James A., and Durst, H. Dupont. **Versatile New Ion Source for the Analysis of Materials in Open Air under Ambient Conditions.** *Anal. Chem*, **2005**, 77(8) pp 2297 - 2302; (Accelerated Article) DOI: 10.1021/ac050162j.

Cody, R. B., Laramée, J. A., Nilles, J.M., Durst, H. D. **Direct Analysis in Real Time (DART™) Mass Spectrometry.** *JEOL News*; **2005**.

Laramée, J. A., Cody, R. B., **Chemi-ionization and Direct Analysis in Real Time (DART™) Mass Spectrometry.** In *Encyclopedia of Mass Spectrometry*, Michael L. Gross, editor. Elsevier, in press.

Forensics

Jones, Roger W., Cody, Robert B., McClelland, John F. **Differentiating Writing Inks Using Direct Analysis in Real Time Mass Spectrometry.** *Journal of Forensic Science*, **July 2006**, Vol. 51, No. 4, pages 915-918.

Laramée, J. A., Cody, R. B., Nilles, J.M., Durst, H. D. **Forensic Application of DART (Direct Analysis in Real Time) Mass Spectrometry** in *Forensic Analysis on the Cutting Edge*, Robert D. Blackledge, editor, John Wiley and Sons, Inc, **2007**. ISBN: 0471716448.

Coates, Cristina M. et al. **The persistence of common accelerants measured by direct analysis in real time (DART) time-of-flight mass spectrometry.** *J. Forensic Sci.*, submitted for publication.

Pharmaceuticals

Fernández, Facundo M. et al. **Characterization of Solid Counterfeit Drug Samples by Desorption Electrospray Ionization and Direct-analysis-in-real-time Coupled to Time-of-flight Mass Spectrometry.** *ChemMedChem* July, 10, **2006**, v. 1 no. 7, 702-705.
Published Online: **8 May 2006**
DOI: 10.1002/cmdc.200600041

Diffendal, Jason, et al. **Direct Analysis in Real Time for Reaction Monitoring in Drug Discovery.** *Anal. Chem.*, **2007**. 79 (13), 5064-5070.

Biological

Pierce, Carrie Y. et al. **Ambient generation of fatty acid methyl ester ions from bacterial whole cells by direct analysis in real time (DART) mass spectrometry.** *Chem. Commun.*, **2007**. DOI: 10.1039/b613200f.

Food, Flavors and Fragrances

Applications Notes for the JEOL AccuTOF-DART, visit our webpages or click on the notebook image.



Haefliger, Olivier P. and Jeckelmann, Nicolas. **Direct mass spectrometric analysis of flavors and fragrances in real applications using DART.** *Rapid Commun. Mass Spectrom.* **2007**, 21: 1361-1366.

Vail, T., Jones, P.R., Sparkman, O.D. **Rapid and unambiguous identification of melamine in contaminated pet food based on mass spectrometry with four degrees of confirmation.** *J. Anal. Toxicol.*, **2007**, 31 (6):304-12.

Synthesis

Morlock, Gertrud and Ueda, Yoshihisa. **New coupling of planar chromatography with direct analysis in real time mass spectrometry.** *Journal of chromatography A*, 1143, **2007**, 243-251.

Kpegba, K., et al. **Analysis of Self-Assembled Monolayers on Gold Surfaces Using Direct Analysis in Real Time Mass Spectrometry.** *Anal. Chem.*, 79, 14, 5479-5483, **2007**. 10.1021/1c062276g.

Taking Mass Spec Into the Open

Open-air ionization methods were featured in the October 8th issue of **C&E News**.

The article, *Taking Mass Spec Into The Open*, describes methods that are either commercially available or currently in development.

Since DART is one of the few widely used open-air ionization techniques available in the market, our users were quoted heavily as they shared their experiences with DART.

Some excerpts:

"Ambient ionization methods are helping Facundo Fernandez identify counterfeit pharmaceuticals. Fernandez, an assistant professor of chemistry at Georgia Institute of Technology, collaborates with scientists at the Centers for Disease Control & Prevention and the Wellcome Trust to investigate antimalarial medications collected in Southeast Asia."

"Jeanette Adams gets excited talking about all the things she can do with mass spectrometry at the Library of Congress. A scientist in its Preservation Research & Testing Division, Adams uses mass spectrometry to look for early signs of degradation in documents, photographs, and microfilm from the library's collections. In most cases she does so without even taking a sample, thanks to an ionization method called DART (direct analysis in real time)."

For access to the full article, click here:

<http://pubs.acs.org/cen/coverstory/85/8541cover.html>