



Visit of prof dr Jose Almirall to the Netherlands

June 20 & 21st, 2016 – The Hague and Amsterdam

Special Invitation

On Monday and Tuesday, June 20th and 21st, prof dr Jose Almirall, professor in forensic chemistry and director of the International Forensic Research Institute (IFRI) at Florida International University (Miami, Florida) will visit the Netherlands. He will discuss ongoing research collaborations with the NFI and the Co van Ledden Hulsebosch Center. Prof Almirall is an experienced forensic chemist with an impressive career in both law enforcement and forensic science. On request of the CLHC he will give two presentations during his stay in the Netherlands in two special forensic colloquiums. On Monday he will present his latest research on printing ink evidence at Amsterdam Science Park and on Tuesday recent work on chemical identification strategies of new psychoactive substances will be discussed at the NFI. All with a forensic chemistry interest are invited to attend these presentations.

Monday June 20th – Amsterdam

- 14:00-15:00 Colloquium at UvA Science Park
Comparison and Characterization of Printing Ink Evidence
Room C1.112, Building 904

Tuesday June 21st - The Hague

- 14:30-15:30 Colloquium at NFI
Growth of NPS in the USA and analytical strategies for chemical identification
Co van Ledden Hulsebosch Auditorium

Attending the presentation at the NFI

When you want to attend the presentation at the NFI but you do not work at the institute please send an email to a.van.asten@nfi.minvenj.nl including your name, email address and affiliation. You will then be registered as an NFI visitor allowing you to attend the colloquium. Please make sure to be in time and report to the security desk at the main entrance. Upon registration you need to show a valid ID, the registration process will take 5-10 minutes.

Venues

Amsterdam Science Park :
Science Park 904 1098 XH Amsterdam
<http://www.amsterdamsciencepark.nl/location-facilities/route-description/directions-by-car/>

Netherlands Forensic Institute :
Laan van Ypenburg 6, 2497 GB Den Haag
http://www.nederlandsforensischinstituut.nl/over_het_nfi/contact/

Characterization and Comparison of Printing Ink Evidence

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With the growing number of low-cost, high-quality printers appearing on the market, it has become easier to counterfeit certain security documents, requiring a need for better methods to compare counterfeit documents and to associate a counterfeit document to a printing source. The elemental profile of printing inks may provide valuable information for the differentiation of the inks from different sources, enabling the analyst to make an inference about a common source when no differences in the profile is found. In this study, a total of 319 ink specimens comprising four different types of printing inks (toner, inkjet, offset, and intaglio) were analyzed by Scanning Electron Microscopy-Energy Dispersive X-Ray Spectroscopy (SEM-EDS) and Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS). Samples of the same ink type were qualitatively compared using spectral overlay and by statistical methods. For the toner inks, a 99.1% of all the different toners were discriminated from each other using LA-ICP-MS and 97.2% discrimination was achieved using SEM-EDS. The improved discrimination with LA-ICP-MS is not surprising due to its higher sensitivity, which allows for the detection of many more elements. However, SEM-EDS has the advantage of both elemental analysis and imaging capabilities. This is particularly important for toner inks since the toner particle morphology can provide an additional means of differentiation for those inks that are indistinguishable by their elemental profile. For both techniques, the highest discrimination (99.9% for LA-ICP-MS and 98.2% for SEM-EDS) was observed for intaglio inks, used in currency and security documents, as a result of the greater number and variety of metals present in the ink formulations. To assess each instrument's capability of correctly associating ink samples originating from the same source, duplicate controls were analyzed and compared to the corresponding reference sample. For SEM-EDS, all duplicate controls for toner, inkjet, and intaglio samples were correctly associated using spectral overlay. One offset duplicate was not correctly associated due to quantitative differences for the elements detected. For LA-ICP-MS, all inkjet, offset, and intaglio duplicates were correctly associated, while two toner duplicates were incorrectly excluded; however, it is worth noting that the two duplicates were analyzed with a different laser ablation unit than that used for the reference samples. LA-ICP-MS provides excellent discrimination (>99.0%) for all four printing ink types owing to its high sensitivity for direct analysis of the ink sample (LODs <1 ppm in the ink). Moreover, the technique also provides low false exclusion rates (no false exclusions for inkjet, offset, and intaglio, and 10% false exclusions for toners). Despite its relatively low sensitivity (LODs of ~1000 ppm), SEM-EDS performed surprisingly well for the analysis of toner and intaglio inks and provided a low false exclusion rate for all ink types (no false exclusions for toner, inkjet, and intaglio inks, and a 5% false exclusion rate for offset inks). The technique is particularly suitable for the analysis of toners, allowing for the comparison of toner particle morphology. However, SEM-EDS shows limited utility for the analysis of offset and inkjet inks.

Growth of NPS in the USA and Analytical Strategies for Chemical Identification

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In the new era of drug abuse, the proliferation of new psychoactive substances (NPS), commonly referred to as 'designer drugs' or 'legal highs', has been a global concern. These substances are produced to circumvent current laws for controlled substances by minor modifications in their chemical structure. Many efforts have been made to characterize such substances but challenges remain because of (1) the continual emergence of newly identified substances, (2) the lack of a universal screening test for NPS that are structurally similar to each other, and (3) the complex and time-consuming chromatographic techniques currently used. A combination of analytical methods were developed and evaluated to overcome at least some of these challenges. For rapid screening purposes, a commercial ion mobility spectrometry with a ^{63}Ni ion source (^{63}Ni -IMS) and also direct analysis in real time coupled to a quadrupole time-of-flight mass spectrometer (DART-QTOF-MS) were investigated. The results showed that rapid detection by ^{63}Ni -IMS and identification by DART-QTOF-MS can be achieved with sub-nanogram detection capability and high speed total analysis times (< 2 min.). Gas chromatography (GC) has been coupled to state-of-the-art mass spectrometers, including triple quadrupole (MS/MS) and quadrupole time-of-flight (QTOF) and these hyphenated separation/identification methods facilitate the unambiguous identification of emerging NPS, particularly when using a chemical ionization (CI) source. In addition, constitutional isomers of NPS were differentiated with the capabilities of product ion scans and multiple reaction monitoring (MRM) modes. Finally, the coupling of IMS with a mass spectrometer (IMS-MS) was investigated as an alternative confirmatory technique. With the development of an optimal solvent system in the electrospray ionization (ESI) process, the rapid analysis and identification of synthetic cathinone was successfully achieved less than five minutes. As a proof-of-concept, seized drugs samples provided by a local forensic laboratory were analyzed using the developed methods and the results from seized drug samples are presented.

Short Biography of prof dr Jose Almirall



Dr. José R. Almirall is a Professor in the Department of Chemistry and Biochemistry and Director of the International Forensic Research Institute (IFRI) at Florida International University. He was a practicing forensic scientist at the Miami-Dade Police Department Crime Laboratory for 12 years, where he testified in over 100 criminal cases in state and federal courts prior to his academic appointment at FIU in 1998. Professor Almirall has authored one book and ~ 120 peer-reviewed scientific publications in the field of analytical and forensic chemistry and presented ~ 600 papers and workshops in the U.S., Europe, Central and South America, Australia, New Zealand, Japan and South Africa. The interests of Prof. Almirall's research group include fundamental analytical chemistry and the development of analytical chemistry tools for use in forensic chemistry including materials analysis, trace detection and analysis of drugs and explosives. His research group has been awarded 3 patents resulting from technology developed at FIU and received ~ \$ 7 million in research funding from federal agencies such as the NSF, DoD, NIH, TSWG, NIST and from industry sources. Prof. Almirall is a Fellow of the American Academy of Forensic Sciences (AAFS) since 2004 and a member since 1995. He was the founding chairman of the Forensic Science Education Programs Accreditation Commission (FEPAC) of the AAFS, past Chair of the FBI-sponsored Scientific Working Group on Materials (SWGMAT) Glass subgroup, serves as co-editor-in Chief of Forensic Chemistry and on the editorial boards of two other forensic science journals. Two different governors of the State of Virginia appointed him to the Scientific Advisory Committee of the Department of Forensic Science Commonwealth of Virginia where he served for 10 years. Dr. Almirall has served as a consultant to the United Nations Office on Drugs and Crime (UNODC) and to the International Atomic Energy Agency (IAEA) on forensic science matters. He was appointed to serve on the Forensic Science Standards Board (FSSB) of the Organization of Scientific Area Committees (OSAC) in 2015. He has trained 8 post-doctoral fellows, 25 PhD students, 20 MS students and more than 30 undergraduate students in research. His current FIU research group consists of 15 researchers including visiting scientists on sabbatical from other institutions, post-doctoral fellows in chemistry, PhD students in forensic chemistry, MS students in forensic science and undergraduate students in chemistry.

More information :

<http://faculty.fiu.edu/~almirall/>

<http://ifri.fiu.edu/>