

## Report on 21<sup>st</sup> International Conference on Flow Injection Analysis and Related Techniques (ICFIA 2017) held in St. Petersburg, Russia, September 3–8, 2017

Gary D. Christian

*Department of Chemistry, University of Washington, Box 351700  
Seattle, WA 98195-1700 USA*

### 1. Introduction

The joint meeting of ICFIA and the Japanese Association for Flow Injection Analysis (JAFIA) was held in the historical city of St. Petersburg, taking place at the Solo Sokos Hotel Palace Bridge, located in the historical center of St. Petersburg on the Vasilievsky Island. The conference was dedicated to the 80<sup>th</sup> birthday of Gary Christian.

It was hosted by Andrey Bulatov, St. Petersburg State University, and colleagues from the local organizing committee: Irina Timorfeeva (Secretary), Christina Vakh, Andrey Shishov, Lawrence K. A. B. Nugbierno, Daria Kanashina, Polina Davletbaeva, Daria Nechaeva, and Aleksie Poschivalov.

It was organized by the St. Petersburg State University, along with the Department of Analytical Chemistry, Institute of Chemistry, and the Japanese Association for Flow Injection Analysis (JAFIA) and the Scientific Council of Analytical Chemistry of the Russian Academy of Sciences.

There were 116 participants from 21 countries (the 21<sup>st</sup> ICFIA!): Australia, Brazil, China, Czech Republic, France, Germany, Iran, Japan, Korea, Mexico, Poland, Portugal, Russian Federation, Spain, Slovakia, Sweden, Switzerland, Thailand, Turkey, Ukraine, and the United States. Thailand was well represented with 21 participants. And JAFIA had a usual large contingent with 20 participants. Our Russian hosts were represented with 21 participants.

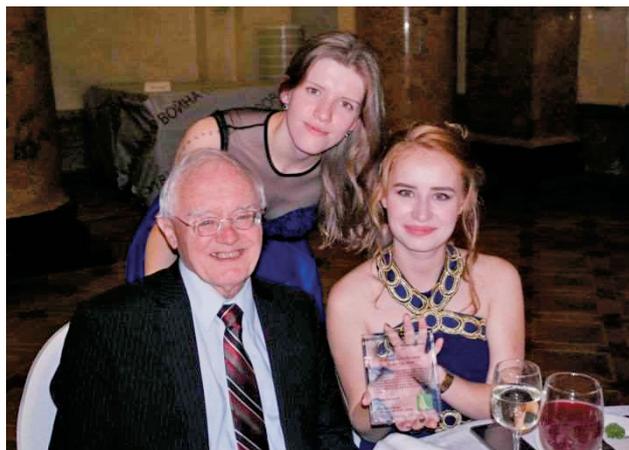
### 2. Social Events

A welcome cocktail reception was held Sunday evening at the hotel. Refreshments and snacks were served. On Monday after the conference, we had an excursion to the Dmitry Mendeleev Memorial Museum Apartment at Saint Petersburg State University. Tuesday was free, and a boat trip was arranged to one of the most beautiful surroundings of St. Petersburg – Peterhof, with lunch at the Nikolskiy Restaurant (Peterhof). On Wednesday evening, we were treated to a visit to the masterpiece of the Hermitage Museum of St. Petersburg.

On Thursday evening, a gala dinner was held at the Palace of Prince Alexander Bezborodko, with Russian traditions and customs, beginning with a sampling of Russian vodka, and with tributes to Gary's 80<sup>th</sup> birthday and an awards ceremony. The lovely young ladies of Andrey's team were spectacular in their long gowns. Following the dinner, we were treated to a late night St. Petersburg Drawbridge Show.

### 3. Scientific Program

The program included 13 keynote lectures, 4 invited lectures,



34 oral presentations, 10 short (lightning) oral communications, and 59 poster presentations, held Monday, Wednesday, Thursday, and Friday. The 12 presentation sessions were chaired by Duangjai Nacapracha, Wolfgang Frenzel, Stanisława Koronkiewicz, Paweł Kościelniak, Raquel Mesquita, Petr Solich, Joanna Kozak, Victor Cerdà, Marek Trojanowicz, Petr Chocholouš, António Rangel, Burkhard Horstkotte, Manuel Miró, Spas Kolev, Kate Grudpan, José L. F.

Costa Lima, Toshiko Imato, Norio Teshima, Andrey Shishov, Jean-Luc Boudenne, Fernando Maya, Gulnara Safina, Peter Hauser, and Marcin Wiczczonek.

#### 4. Keynote Lectures

The program began Monday morning with an opening lecture by *Gary Christian* (University of Washington, USA), suggested by *Andrey Bulatov*, entitled “Innovations in the teaching of analytical chemistry: How they have evolved”. He drew on his textbook writings and teaching experiences to illustrate the importance of analytical chemistry in our lives, trace the historical development of our discipline, and how textbooks and teaching techniques have evolved.

*Marek Trajanowicz* (Institute of Nuclear Chemistry and Technology, Warsaw, Poland) followed with a review of multicomponent radionuclide determinations in flow systems for monitoring of nuclear reactor operations and safety. *António Rangel* (Universidade Católica Portuguesa, Portugal) described applications of solid phase extraction and functionalized sorbent material in flow analysis. *Victor Cerdà* (University of the Balearic Islands, Spain) reported on hyphenated techniques in flow analysis.

*Peter Solich* (Charles University, Faculty of Pharmacy, Czech Republic) reviewed the role of monolith columns in flow analysis. *Vladimir Kuznetsov* (Mendeleev University of Chemical Technology, Russia) described flow injection analysis as interplay between kinetics and thermodynamics. *Pawel Kościelniak* (Jagiellonian University in Krakow, Poland) reported on the implementation of flow techniques to routine analysis. *Toshihiko Imato* (Kyushu University, Japan) described flow-based analysis on a compact disk type microchip with electrogenerated chemiluminescence detection.

*Kate Grudpan* (Chiang Mai University, Thailand) described the employment of modern information technology in flow analysis and non-flow techniques for modern green chemical analysis. *Spas Kolev* (The University of Melbourne, Australia) described the application of polymer inclusion membranes and beads in flow analysis.

*Tatiana Tennikova* (St. Petersburg State University) reviewed polymer monoliths: past, present and perspectives. *Duangjai Nacapricha* (Mahidol University, Thailand) described a lab on paper system for an effective and low-cost way to do microfluidic analysis.

*Elias Zagatto* (Center for Nuclear Energy in Agriculture, Sao Paulo University, Piracicaba, Brazil) was unable to attend, but sent a very nice video to describe his meeting and friendship with Gary, and his talk on the use of fluidized beds in flow analysis.

#### 5. Invited Lectures

*Manuel Miró* (University of the Balearic Islands) described automatic flow-based physiologically extraction tests for investigation of bioaccessible metal species in environmental solids and food stuff. *Peter Hauser* (University of Basel, Switzerland) reported on a microfluidic breadboard approach to flow methods. *Wolfgang Frenzel* (Technical University of Berlin, Germany) reported on the role of FIA/SIA in solving



analytical problems in environmental research: A critical stock-taking. *Dimitry Kirasanov* (St. Petersburg State University) described the use of chemometrics in flow analysis.

## 6. Oral Presentations

### Instrumentation/detection/devices/software

There were a number of presentations dealing with novel systems for performing flow analysis measurements. *Shoji Motomizu* (Okayama University, Japan) described computer-controlled mobile chemical analysis (CC-MCA) for multi-component analysis. *Melisa Rodas Ceballos* (University of Balearic Islands) described a hyphenated MSFIA-LOV system with a homemade liquid scintillation detector for radionuclear determination at environmental levels. *Phoonthawee Saetear* (Université de Montpellier Ecole Nationale Supérieure de Chimie de Montpellier, France) utilized the temperature dependent schlieren effect in liquid flow for chemical analysis. *Pathinan Paengnakorn* (Chiang Mai University) described a novel simple dual electrochemical-colorimetric sensor system and instrumentation.

*Shaorong Liu* (The University of Oklahoma, USA) developed a chip-capillary hybrid device for micro-scale flow injection analysis. *Stanislawa Koronkiewicz* (University of Warmia and Mazura, Poland) reported on a novel pulsed xenon flash lamp photoreactor and its potential application in flow analysis. *Ilkka Lahdesmaki* (FIALab Instruments, Inc. USA) described a practical approach of multivariate analysis for FIA and SIA methods. *Waraporn Threeprom* (Mahidol University, Thailand) developed a microfluidic spectrometric device for arsenic monitoring in water samples. *Gulnara Safina* (University of Gothenburg and Chalmers University of Technology, Sweden) measured the rate of cellular uptake of nanoparticles using surface plasmon resonance. *Purim Jarujamrus* (Ubon Ratchathani University, Thailand) described argentometric and complexometric titrations using thread-based analytical devices.

### Separation/preconcentration/reactors/reagents

Various approaches were utilized in sample handling and analysis. *Andrey Bulatov* (St. Petersburg State University) described automated sample pretreatment of food and pharmaceuticals based on a stepwise injection system. *Mikhail Stakus* (Moscow State University, Russia) used subcritical water as an eluent for flow analysis systems, including solid phase extraction. *Jirayu Sitamurak* (Mahidol University) described a membraneless gas-separator microfluidic paper-based analytical device for green and direct analysis of concentrated hypochlorite in commercial household products. *Justyn Paluch* (Jagiellonian University in Krakow) developed a sequential injection system with in-line solid phase mini-column extraction for zinc and copper determination.

*Kei Toda* (Kumamoto University, Japan) analyzed atmospheric carbonyl in gaseous and particulate phases by using a flow-based parallel plate wet denuder and particle collector for on site analysis in Kumamoto and on the top of Mt. Fuji. *Kazuhiko Tsukagoshi* (Doshisha University, Japan) described a tube radial distribution chromatography developed by combining an open-tubular capillary tube as separation column and a commercial HPLC system. *Fernando Maya* (University of the Balearic Islands) used mixed-matrix disks containing micro/nanomaterials as novel supports for



automated solid-phase extraction. *Rattikan Chantiwas* (Mahidol University) used sequential injection-liquid microextraction with GC-FID for analysis of short-chain fatty acids in palm oil mill effluent. *Inga Markeviciute* (Technische Universität Berlin, Germany) described flow-through sampling and sample preparation in hyphenation to ion chromatography.

*Joanna Kozak* (Jagiellonian University in Krakow) described flow based speciation analysis. *Norio Teshima* (Aichi Institute of Technology, Japan) reported on an automated pre-column derivatization HPLC determination of aldehydes and acetone using simultaneous injection for effective mixing flow analysis. *Petr Chocholous* (Charles University, Faculty of Pharmacy) described various approaches in the on-line solid-phase extraction for trace metal analysis. *Burkhard Horskotte* (Charles University, Faculty of Pharmacy) described lab-in-syringe automated head-space extraction coupled online to FID-GC for sensitive determination of BTEX in surface waters.

*Joana Miranda* (Universidade Católica Portuguesa) measured iron(III) in waters by microsequential injection solid phase spectrometry using a hexadentate 3-hydroxy-4-pyridine chelator as a color reagent. *Ryoichi Ishimatsu* (Kyushu University) described probing radical anion of pyrene with electrogenerated chemiluminescence. *Maliwan Amatongchai* (Ubon Ratchathani University, Thailand) described selective amperometric flow injection analysis for carbofuran based on a molecular imprinted polymer and gold-coated magnetic modified carbon nanotubes-paste electrode.

### Applications

Flow and related methods continue to offer advantage in

providing analytical solutions, as evidenced from the variety of reported applications. *Marcin Wieczorek* (Jagiellonian University in Krakow) developed a chemical H-point standard addition method on the basis of the gradient ratio flow injection technique. *Jaroon Jakmunee* (Chiang Mai University) described a compact hydrodynamic sequential injection system for multi-parameter determination of soil quality. *Chalermpong Saejum* (Chiang Mai University) described flow techniques for quality control in Miang (traditional fermented tea) production in Northern Thailand. *Raquel Mesquita* (Universidade Católica Portuguesa) performed soil/water interface assessment using sequential injection for multiparametric analysis.

*Kazuaki Ito* (Kindai University, Japan) reported on the simultaneous determination of inorganic nitrogen and phosphate species in seawater samples. *Wasin Wongwilat* (Chiang Mai University) described a Chiang Mai model for cost effective alternative precision agriculture. *Lawrence Nugbienny* (Kazan National Research Technological University, Russia) described the determination of acetylator phenotypes in humans, the SWIA determination of procainamide in urine and saliva.

## 7. Lightning Talks

A special session featuring young scientists, with 5 minute presentations without questions + poster presentations, was held Thursday afternoon.

### Instrumentation/detection/reaction/devices/software

*Hana Sklenarova* (Charles University, Hradec Králové) developed automation of luciferase determination in a sequential injection system with chemiluminescence detection for cytotoxicity testing. *Kanokwan Kiwfo* (Chiang Mai University) described a novel simple flow setup and procedure for kinetic studies. *Daria Nechaeva* (St. Petersburg State University) developed a voltammetric determination of hydrogen sulfide in marine fuel using paper-based microfluidic devices. *Elodie Mattio* (Aix Marseille Univ, CNRS, LCE, France) prepared a 3D printed lab-on-valve for lead and cadmium quantification in water. *Joonchul Shin* (Yonsei University, South Korea) reported a forensic profiling device for real time estimation of postmortem interval from bacteria analysis with a smartphone based electrochemical immunosensor.

### Separation/preconcentration/reactors/reagents

*Marcel Alaboud* (St. Peterburg State University) reported on an automated magnetic dispersive solid phase microextraction in a fluidized reactor for the determination of fluoroquinolone antimicrobial drugs in baby food samples. *Daria Kanashina* (St. Petersburg State University) developed a novel microextraction technique for HPLC-MS/MS determination of insecticides in beverages. *Vera Somova* (St. Petersburg State University) reported a new variant of hydrophilic interaction liquid chromatography for determination of highly polar drugs in body fluid.

### Applications

*Ana Machado* (Universidade do Porto) developed a noninvasive technique for monitoring glucose levels in saliva by sequential injection determination. *Yuliia Miekh* (Oles



*Honchar Dnipropetrovsk National University, Ukraine*) described the simultaneous kinetic spectrophotometric sequential injection determination of two reducing agents with 18-molybdo-2-phosphate heteropoly complex.

## 8. Poster Sessions

Posters were Thursday afternoon. Presentations covered a broad spectrum of flow analysis topics, including fundamental studies, instrumentation, automation, microfluidics, titrations, detection systems, on-line processing, and applications. There were contributions from China, Czech Republic, France, Germany, Iraq, Japan, Korea, Mexico, Poland, Portugal, Russia, Spain, Thailand, and Turkey.

## 9. JAFIA Awards

The Japanese Association for Flow Injection Analysis presented, at the banquet, their prestigious FIA awards for 2017, consisting of a certificate and a medal.

**The FIA Award for Young Researchers** was given to:

- 1) Associate Professor *Hiroya Murakami*  
Aichi Institute of Technology, Japan  
For "High Performance Pretreatment, Separation and Detection System for Trace Analysis"
- 2) Dr. *Fernando Maya Alejandro*  
University of the Balearic Islands, Spain  
For "Combining Advanced Materials with Flow-Based Techniques for Improved Sample Preparation"

**The FIA Award for Science** was given to:

- 1) Professor *Jaroon Jakmunee*  
Chiang Mai University, Thailand  
For “Development of Cost-Effective Flow-Based Analysis with Electrochemical Detection”
- 2) Professor *Joanna Kozak*  
Jagiellonian University, Poland  
For “Development of Flow-Based Procedures for Titrimetric and Two-Component Analysis”
- 3) Professor *Eiko Nakamura*  
Yokohama National University, Japan  
For “Development of Method for Quantitative Determination of Harmful Substances in Soil Elution Amount/Content Test Solution Using Simplified FIA Device”

She received her award at the 54<sup>th</sup> FIA conference in Okayama his coming December.

Our congratulations to all.

#### 10. Award Ceremony of Best Lightning Talks and Poster Presentations

Certificates were awarded at the banquet for the top Lightening Talk presentations and top poster presentations by young investigators.

**The Best Lightning Talk awards** go to:

- 1) *Elodie Mattio* from France with the presentation “3D Printed Lab-on-Valve for Lead and Cadmium Quantification in Water”
- 2) *Ana Machado* from Portugal with the presentation “Development of a Noninvasive Technique for Monitoring Glucose Levels in Saliva by Sequential Injection Determination”

**The Best Poster Presentation awards** go to:

- 1) *Kateřina Fikarová* from Czech Republic with the presentation “Development of Microfluidic Spectrometric Device for Arsenic Monitoring in Water Samples”
- 2) *Autchara Paukpol* from Thailand with the presentation “Automatic Sequential Injection Greener Anodic Stripping Voltammetry with Monosegmented Flow for Simultaneous Determination of Cadmium and Lead in Soil Samples”
- 3) *Hayato Araki* from Japan with the presentation “Development of Highly Sensitive Quantitative Method of Acetaldehyde-DNA Adducts by LC-ESI-MS/MS”
- 4) *Jantima Upan* from Thailand with the presentation “Sequential Injection-Differential Pulse Voltammetric Immunosensor for Hepatitis B Surface Antigen Using Silver Nanoparticles as Electrochemical Probe on the Modified Screen Printed Electrode”
- 5) *Thania Alexandra Ferreira* from Mexico with the presentation “On-Line Determination of Cr(VI) by Adsorption Cathodic Stripping Voltammetry on an Immobilized Magnetic Poly(ionic liquid) modified electrode”

Congratulations to all.

#### 11. Sponsors/Exhibitors

Sponsors included FIAlab ([www.flowinjection.com](http://www.flowinjection.com)),



Petroanalytics (<http://petroanalytica.ru>),

ПЕТРОАНАЛИТИКА  
Analyt-Shimadzu

(<http://analit-spb.ru>), and the Russian Foundation for Fundamental Research.

#### 12. Publication of the Proceedings

Papers for the conference will be submitted for peer review for a Virtual Special Issue (VSI) of *Talanta*, with Guest Editor Andrey Bulatov. Accepted papers will be published individually in regular issues. They will also be simultaneously added into the online Virtual Special Issue hosted at Science Direct. In this manner, no manuscript publication delay will occur.

#### 13. ICFA 22

The International Steering Committee met on Tuesday

evening to discuss the future of the conference. It was decided by the Steering Committee that ICFA 22 will be held in Marseille, France, hosted by Professor Jean-Luc Boudenne

of Aix-Marseille University, CNRS, LCE, scheduled for June 14-19, 2020. For information, he may be contacted at [jean-luc.boudenne@univ-amu.fr](mailto:jean-luc.boudenne@univ-amu.fr)

