

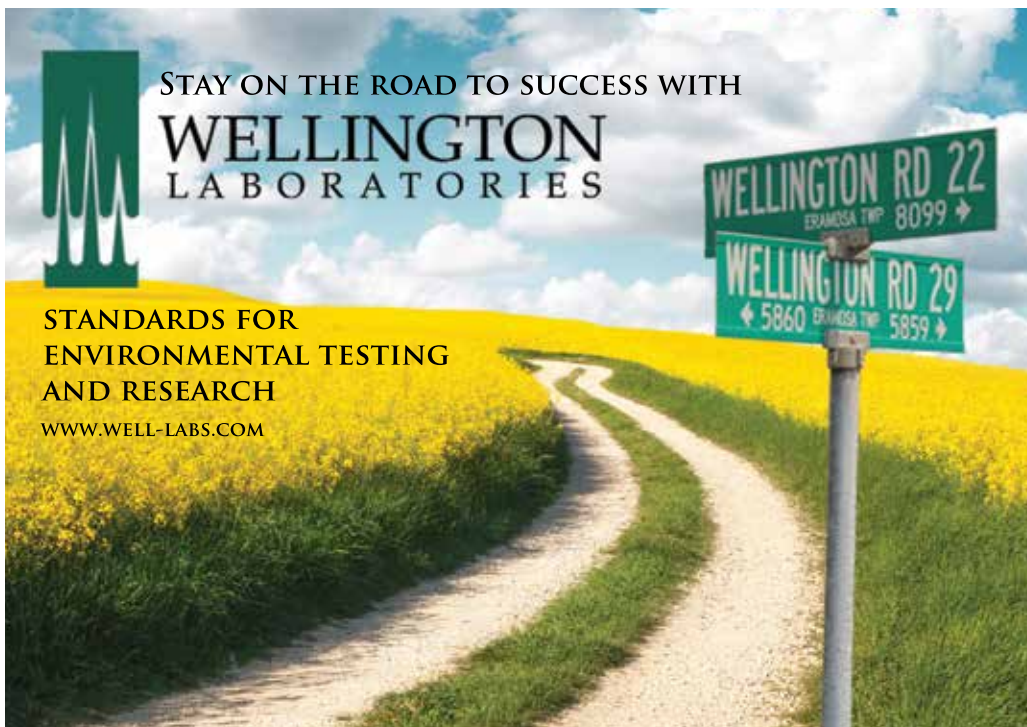
# BFR

10th International Symposium on Flame Retardants

## ATHENS 2022

**4-7**  
**September**  
**2022**  
Athens, Greece

[bfr2022.org](http://bfr2022.org)



Dear friends and colleagues,  
 Welcome to Athens!

On behalf of the Local Organizing Committee, the Scientific Committee, and the International Scientific Committee, it is with great pleasure that we welcome you to the 10th International Symposium on Flame Retardants (BFR2022) in the historic city of Athens, the cradle of modern science and philosophy.

After two postponements, we gather around 100 participants from all over Europe, USA, Canada, Morocco, Turkey, South Africa, Korea, Japan and China. Leaving behind the two hard years of Covid-19, lockdowns and travel restrictions, we are able to meet in person again and have creative discussions and scientific and social interactions, in order to make progress in life and science.

The theme of BFR 2022 is expanded beyond the usual topics and includes sessions on chlorinated paraffins, remediation/destruction technologies and regulatory policy. EFSA will join BFR 2022 with a special session on "EFSA risk assessments of BFRs in food".

There will be 3 outstanding plenary lectures by Alwyn Fernandes (University of East Anglia, UK), Heather Patisaul (North Carolina State University, USA) and Roxana Suehring (Ryerson University, Canada), 38 oral presentations and 24 posters.

Two cash prizes will be awarded to the best student presentations.

Selected papers will be invited to contribute to a special issue of Chemosphere dedicated to BFR 2022.

The social program will include an opening reception at the roof garden of Royal Olympic Hotel with an astonishing view of Athens, and a banquet at Thissio View Restaurant under the Acropolis and Parthenon.

BFR 2022 marks the 21st anniversary of the BFR Symposia since the first official BFR symposium organized in 2001 in Stockholm, Sweden by Professor Ake Bergman and is dedicated to the late Mehran Alaei, chair of BFR 2019, who entrusted us with the task, but unfortunately was not able to see it come to fruition.

We would like to thank our sponsors (Wellington Laboratories, Greyhound Chromatography, DSP Systems) for their generous contributions and Attica Region for its support.

We hope that you will enjoy the scientific and social aspects of the conference and also experience the culture, archeological monuments and attractions of Athens, as well as the joyful atmosphere of the city.

**Leondios Leondiadis**, Chair, National Centre for Scientific Research "Demokritos" 15341, Ag.Paraskevi, Athens, Greece

**Olga-Ioanna Kalantzi**, Co-Chair, Department of Environment, University of the Aegean, Mytilene, 81100, Greece



## COMMITTEES

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<b>Leondios Leondiadis</b>	National Centre for Scientific Research "Demokritos"	Greece
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### Conference co-Chair

<b>Olga-Ioanna Kalantzi</b>	University of the Aegean	Greece
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<b>Danae Costopoulou</b>	National Centre for Scientific Research "Demokritos"	Greece
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<b>Nick Kalogeropoulos</b>	Harokopio University	Greece
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<b>Sotirios Karavoltzos</b>	National and Kapodistrian University of Athens	Greece
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<b>Thomas Maggos</b>	National Centre for Scientific Research "Demokritos"	Greece
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<b>Aikaterini Sakellari</b>	National and Kapodistrian University of Athens	Greece
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<b>Irene Vassiliadou</b>	National Centre for Scientific Research "Demokritos"	Greece
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## COMMITTEES

### International Scientific Committee

<b>Åke Bergman</b>	Stockholm University	Sweden
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<b>Linda Birnbaum</b>	National Institute of Environmental Health Sciences	USA
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<b>Jacob de Boer</b>	Vrije University, Amsterdam	The Netherlands
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<b>Myrto Petreas</b>	California Dept. of Toxic Substances Control	USA
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<b>Martin Rose</b>	University of Manchester	England
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<b>Shinichi Sakai</b>	Kyoto University	Japan
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<b>Gang Yu</b>	Beijing Normal University	China
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<b>Nick Kalogeropoulos</b>	Harokopio University	Greece
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<b>Thomas Maggos</b>	National Centre for Scientific Research "Demokritos"	Greece
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<b>Konstantinos Makris</b>	Cyprus University of Technology	Cyprus
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<b>Constantini Samara</b>	Aristotle University of Thessaloniki	Greece
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<b>Denis Sarigiannis</b>	Aristotle University of Thessaloniki	Greece
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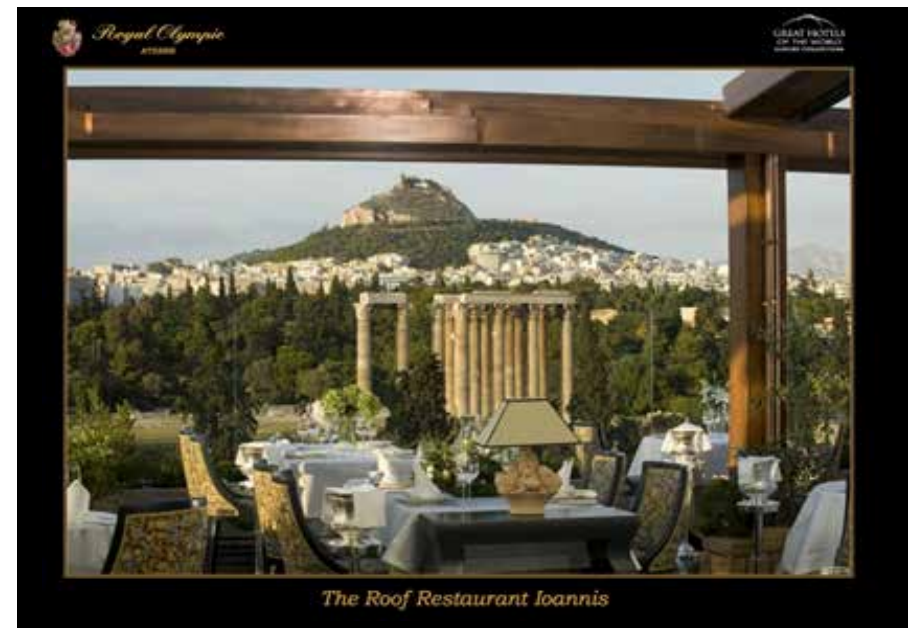
<b>Euripides Stephanou</b>	The Cyprus Institute	Cyprus
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<b>Irene Vassiliadou</b>	National Centre for Scientific Research "Demokritos"	Greece
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## CONFERENCE VENUE

The symposium will be held at the Royal Olympic Hotel ([www.royalolympic.com](http://www.royalolympic.com)) in downtown Athens, in front of the Temple of Zeus. Registration, exhibition and scientific sessions will be at the Olympia Conference Hall. The opening reception will take place at the Roof Garden Restaurant/bar offering the most spectacular views in Athens.



## CONFERENCE DINNER

The conference dinner will be held on Tuesday September 6th from 20:30 at the Thissio View Roof Garden Restaurant (Apostolou Pavlou 25 11851 Athens, [www.thissioview.gr](http://www.thissioview.gr)), at walking distance from the Royal Olympic Hotel. Tickets can be purchased at the registration desk.





## KEYNOTE SPEAKERS

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**Dr. Alwyn Fernandes** is a chartered scientist with more than 35 years of research experience in the fields of environmental and food safety with respect to chemical contaminants and their impact on human health and ecology. He is currently an invited research fellow at the University of East Anglia and chairs an EU (RL) working group on brominated and chlorinated contaminants in food. He has led research on emerging contaminants and food safety at the UK Food and Environment Research Agency (FERA) and previously worked at the Atomic Energy Authority (AEAT).

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**Dr. Heather Patisaul** is a well known developmental neuroendocrinologist currently a Professor and Associate Dean for Research at College of Sciences North Carolina State University, USA. She and her team examine how flame retardants and other endocrine disrupting compounds impact brain development, sexual differentiation and behavior. She is also exploring how chemical exposures impact the brain-placenta axis.

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**Dr. Roxana Suehring** is an Assistant Professor for environmental analytical chemistry at Ryerson University in Toronto, Canada. Her research focus includes the development of novel analytical techniques to evaluate the fate and behavior of emerging organic contaminants in the aquatic environment, their potential for long-range transport into the Arctic and the impact of multiple stressors on contaminant-related environmental risk.



## PROGRAM

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### Sunday 4 September 2022

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19:00 - 22:00 Welcome reception

### Monday 5 September 2022

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9:00 - 9:20 Welcome and house keeping  
Leondios Leondiadis, Chair  
Olga-loanna Kalantzi, Co-chair  
Opening address  
George Patoulis, Regional Governor of Attica

9:20 - 10:05 Plenary lecture  
Alwyn Fernandes  
PL-1 Flame retardants and chlorinated paraffins:  
an overview of analytical challenges, prioritisation and  
occurrence in food

10:05 - 11:05 Analytical methods  
Chair: Rainer Malisch

10:05 - 10:25 O-1 Novel strategy to screen multi-classes  
of BFR by Gas Chromatography-Atmospheric  
Pressure Chemical Ionization-Trapped Ion  
Mobility-Mass Spectrometry  
H. Muller, G. Scholl, J. Far, E. De Pawl, **Gautier Eppe**

10:25 - 10:45 O-2 Changes in Efficacy of XRF screening  
for legislative compliance over a 5-year interval and  
future trends  
**Martin Sharkey**, D. Drage, S. Harrad, W. Stubbings,  
M. Coggins, H. Berresheim

10:45 - 11:05 O-3 Quantification of HBCDD in insects and  
insect-based food  
**Caroline Goedecke**, A. Jahnke, T. Böhm, C. Radach,  
C. Wilming, A. Lüth

11:05 - 11:45 Coffee break and exhibits

## PROGRAM

- 11:45 - 12:45 Chlorinated paraffins**  
**Chair: Åke Bergman**
- 11:45 - 12:05** O-4 Influence of the chromatographic separation in LC-ESI-HRMS on the response factors of chlorinated paraffins homologue groups  
**Cherine Amoura**, E. Bichon, P. Marchand, B. Le Bizec, R. Cariou, G. Dervilly
- 12:05 - 12:25** O-5 New generation of reference standards for chlorinated paraffins – The Eurostars CHLOFFIN, the EU GreenREF and REVAMP projects  
**Huiling Liu**, S.Valderhaug, A. Gorovoi, J. Tuma, O.R. Gautun, J. Nygren, J. Button, C. McKenzie, L.M. van Mourik, M. Ricci, S. Brandsma, J. de Boer, J.E. Johansen
- 12:25 - 12:45** O-6 Certification of the first reference material for SCCPs  
**Marina Ricci**, J. De Boer, J.E. Johansen, H. Liu, J. Button, L.M. van Moutik
- 12:45 - 14:00 Lunch**
- 14:00 - 15:20 EFSA Session**  
**Chair: Christer Hogstrand**
- 14:00 - 14:20** O-7 EFSA's risk assessments on BFRs: an overview of past and ongoing assessments  
**Luisa Ramos Bordajandi**
- 14:20 - 14:40** O-8 Occurrence data and exposure assessment of BFRs in the European population  
**Martin Rose**, Luisa Ramos Bordajandi
- 14:40 - 15:00** O-9 Derivation of health-based guidance values or MOE approach for contaminants in food: the example of HBCDDs  
**Marco Binaglia**

## PROGRAM

- 15:00 - 15:20** O-10 Combined exposure to chemical mixtures: the EFSA approach and use for the BFRs mandate  
**Christer Hogstrand**, Luisa Ramos Bordajandi
- 15:20 - 15:50 Coffee break and exhibits**
- 15:50 - 16:50 Flame retardants in food**  
**Chair: Nick Kalogeropoulos**
- 15:50 - 16:10** O-11 Temporal trends in concentrations of brominated flame retardants in UK foodstuffs suggest active impacts of restrictions on PBDEs and HBCDDs  
**Yulong Ma**, W.A. Stubbings, M.A.E. Abdallah, R. Cline-Cole, S. Harrad
- 16:10 - 16:30** O-12 First assessment of polychlorinated naphthalenes contamination in French fish and seafood products, and contribution relative to other persistent organic pollutants  
**Mathilde Godéré**, A. Venisseau, J.-C. Leblanc, P. Marchand, B. Le Bizec, G. Dervilly
- 16:30-16:50** O-13 Targeted and non-targeted screening of flame retardants in urban honey  
**Gabriel Leung**, C. Akiki, S. Bilamjian, L. Tian, L. Liu, S. Bayen
- 16:50-18:30 Poster session**



## PROGRAM

### Tuesday 6 September 2022

- 9:00 - 9:45** Plenary lecture  
**Heather Patisaul**  
PL-2 Flame retardants and developmental neurotoxicity: what's new?
- 09:45 - 10:45** Human exposure/Health effects  
Chair: **Jacob de Boer**
- 09:45 - 10:05** O-14 WHO- and UNEP-coordinated exposure studies 2000 – 2019: findings of polybrominated substances (PBDEs, HBCDDs, PBB-153, PBDD/PBDF)  
**Rainer Malisch**, A. Schächtele, B. Hardebusch, F.X.R. van Leeuwen, G. Moy, A. Tritscher, M. van Duursen, M. van den Berg, K. Šebková, J. Klánová, J. Kalina
- 10:05-10:25** O-15 Metabolic disrupting effects of brominated flame retardant and inorganic contaminant mixtures  
R. Berube, M. LeFauve, S. Heldman, Y.-T. Chiang, J.A. Birbeck, J.A. Westrick, **Christofer Kassotis**
- 10:25-10:45** O-16 Brominated flame retardant accumulation in the placenta: tissue distribution and temporal trends  
**Heather Stapleton**, S. Gaballah, M. Ruis, K. Hoffman, B. Horman, H. Patisaul
- 10:45-11:15** Coffee break and exhibits
- 11:15-12:35** Human exposure/Health effects  
Chair: **Martin Rose**
- 11:15-11:35** O-17 Halogenated flame retardants in waste childcare articles from Ireland  
D. Drage, M. Sharkey, M. Alghamdi, W. Stubbings, H. Berresheim, M. Coggins, A. Rosa, **Stuart Harrad**

## PROGRAM

- 11:35-11:55** O-18 Children's exposure to brominated flame retardants and DNA methylation: a case study from Morocco  
Aziza Menouni, **Kaoutar Chbihi**, L. Godderis, M. Ghosh, R.C. Duca, E. Jaafari
- 11:55-12:15** O-19 PBDEs, HBCDDs and NBRs in paired human breast milk samples and house dust from Denmark  
**Marie Frederiksen**, S.C. Hammel, K. Vorkamp, J.B. Nielsen, L.S. Sørensen, L.E. Knudsen
- 12:15 - 12:35** O-20 Children's exposure to legacy and novel flame retardants: comparing exposure assessment tools across chemical classes  
**Kate Hoffman**, S. Hammel, A. Phillips, A.M. Lorenzo, T.F. Webster, H.M. Stapleton
- 12:35 - 14:00** Lunch
- 14:00 - 15:00** Human exposure / Chlorinated paraffins  
Chair: **Philippe Marchand**
- 14:00 - 14:20** O-21 Fate of chlorinated paraffins in animals and humans  
**Darnerud Per Ola**, Å. Bergman
- 14:20 - 14:40** O-22 Far higher concentrations of chlorinated paraffins in blood from nursing women than in their breast milk  
Åke Bergman, B. Yuan, A. Bignert, P. Andersson, C. West, M. Domellöf
- 14:40 - 15:00** O-23 Concentration and homolog profiles of SCCPs and MCCPs in adult serum from the general population in Hangzhou, China  
J. Zhang, **Shanshan Yin**, W. Liu, A. Covaci
- 15:00 - 15:30** Coffee break and exhibits



## PROGRAM

- 15:30 - 16:30** Flame retardants in biota  
Chair: Myrto Petreas
- 15:30 - 15:50** O-24 20-years later: PBDE levels in fish from rivers reported in 2001 as having the world's highest PBDE levels  
Mark J. La Guardia, R.C. Hale
- 15:50 - 16:10** O-25 Photolytic degradation of novel polymeric and monomeric BFRs: investigation of physiological and ecotoxicological effects on *lumbriculus variengatus*  
Esther Smollich, B. Sures
- 16:10 - 16:30** O-26 Potency ranking of organophosphate esters (OPEs) in KGN human granulosa cells using high-content imaging and transcriptomic analysis  
Xiaotong Wang, A. Rowan-Carroll, M.J. Meier, A. Williams, C.L. Yauk, B.F. Hales, B. Robaire
- 16:30 - 18:00** Poster session
- 20:30** Dinner

## PROGRAM

### Wednesday 7 September 2022

- 9:00 - 9:45** Plenary lecture  
Roxana Suehring  
PL-3 Leaving the world a better place - a celebration of Mehran Alaei's work on brominated flame retardants
- 09:45 - 10:45** Flame retardants in abiotic environments  
Chair: Thomas Maggos
- 09:45 - 10:05** O-27 Brominated flame retardants in air around the world  
Jacob de Boer, R. Van Dijk, M. Heinzelmann
- 10:05 - 10:25** O-28 Indoor legacy brominated flame retardants: PBDEs in houses, schools, and café/bar/restaurants  
Mesut Genisoglu, Ö. Edebali, A. Sofuoglu, C. Turgut, S.C. Sofuoglu
- 10:25 - 10:45** O-29 Flame retardants in landfill air in the greater Montreal area: implications for exposure in urban-adapted gulls  
Anaïs Kerric, M. Mazerolle, J. Okeme, L. Jantunen, J.-F. Giroux, M. Diamond, J. Verreault
- 10:45 - 11:15** Coffee break and exhibits
- 11:15 - 12:35** Flame retardants in abiotic environments  
Chair: Dzintars Zacs
- 11:15 - 11:35** O-30 An international investigation of chlorinated paraffins in indoor dust  
Thomas McGrath, R. Cariou, C. Amoura, C. Christia, F. Fujii, R. Dodson, B. Johnson-Restrepo, D. Muenhor, G. Poma, G. Devilly, A. Covaci
- 11:35 - 11:55** O-31 Determination of chlorinated alkanes in the urban atmosphere of Athens, Greece  
Dimitra Balla, D. Costopoulou, D. Zacs, I. Perkons, D. Voutsas, L. Leondiadis, T. Maggos

## PROGRAM

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- 11:55 - 12:15** O-32 Dermal uptake of chlorinated organophosphate flame retardants via contact with furniture fabrics; implications for human exposure  
**Mohamed Abdallah, S. Harrad**
- 12:15 - 12:35** O-33 Evaluating differences in organophosphate ester (OPE) exposure among electronic waste recycling workers and administrative workers using silicone wristbands  
**Stephanie Hammel, K.K. Hansen, A.M. Madsen, H.A. Kolstad, V. Schlünssen, M. Frederiksen**
- 12:35 - 14:00** Lunch
- 14:00 - 15:00** **Organophosphate flame retardants**  
Chair: **Sotirios Karavoltzos**
- 14:00 - 14:20** O-34 Occurrence, distribution and dietary exposure to organophosphate esters in UK foodstuffs  
**Muideen Gbadamosi, M. Abdallah, S. Harrad**
- 14:20 - 14:40** O-35 Organophosphate esters in the urban atmosphere of Thessaloniki, Greece  
**Ioanna Pantelaki, D. Voutsas**
- 14:40 - 15:00** O-36 Co-occurrence of organophosphate tri- and di-esters in water and sediment from the semi-enclosed bays of Korea  
**Jae-Eun Lim, H.B. Moon**
- 15:00 - 15:30** Coffee break and exhibits
- 15:30 - 16:30** **Policy and regulations**  
Chair: **Olga-Ioanna Kalantzi**
- 15:30 - 15:50** O-37 Hazard identification studies of tris (chloropropyl) phosphate administered in feed to Sprague Dawley rats and B6C3F1/N mice  
**Kristen Ryan, S. Auerbach, B. Collins, J.-H. Hsieh, A. King-Herbert, K.R. Shockley, M. Stout, S. Waidyanatha, N. Walker, K. Witt, M. Xu, A. Pandiri**

## PROGRAM

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- 15:50 - 16:10** O-38 Halogenated flame retardants in waste plastics from Ireland: concentrations, legislative compliance, and temporal trends  
D. Drage, M. Sharkey, L.S. Al-Omran, W. Stubbings, H. Berresheim, M. Coggins, A. Rosa, **Stuart Harrad**
- 16:10 - 16:25** Student awards
- 16:25 - 16:40** Introducing BFR 2024 in Korea  
**Hyo-Bang Moon**
- 16:40 - 17:00** Closing remarks  
**Leondios Leondiadis**

## POSTER SESSION

### Analytical methods

- P-1 Optimisation of the PCDD/FS and PCBs extraction and clean-up method for the analysis of polychlorinated naphthalenes  
M. Godéré, **Anaïs Venisseau**, P. Marchand, B. Le Bizec, G. Dervilly
- P-2 Lipid extracts clean-up methods assessment for the detection of halogenated contaminants of emerging concern by non-targeted analysis  
A. Padioleau, R. Cariou, I. Guiffard, **Anaïs Venisseau**, B. Escher, J.P. Antignac, G. Dervilly
- P-3 Haloseeker, a user-friendly software to highlight halogenated chemicals in non-targeted HRMS data sets: presentation and overview of applications  
R. Cariou, S. Hutinet, Y. Guitton, **Mathilde Godéré**, B. Le Bizec, J.-P. Antignac, G. Dervilly
- P-4 Method for the analysis of polybrominated diphenyl ethers (PBDEs) in omega-3 fatty acid by GC-MS/MS  
**David Hope**, M. McLennan, D. Ng, M. Wright
- P-5 Method for the analysis of chlorinated paraffins in food using Fourier-transform ion cyclotron resonance mass spectrometry (FT-ICR-MS)  
**Dzintars Zacs**
- P-6 GC-ECNI-HRMS optimisation for chlorinated paraffins analysis  
**Cherine Amoura**, E. Bichon, P. Marchand, B. Le Bizec, R. Cariou, G. Dervilly

### Flame retardants in food

- P-7 Meat and fish from Belgian market monitoring (2020-2022) of HBCDDs via validated and accredited method by LC-MS/MS  
**Virginie Van Leeuw**, G. Fosseprez, M. Deridder, L. Joly

## POSTER SESSION

- P-8 PBDD/Fs survey in regular dioxin monitoring of food of animal origin and their implication to total TEQ value  
**Sebastian Maszewski**, M. Warenik-Bany, M. Pajurek, S. Mikołajczyk

### Flame retardants in biota

- P-9 Accumulation in tissues and transfer to eggs of short-, medium-, and long-chain chlorinated paraffins after dietary exposure of laying hens  
M. Mézière, **Philippe Marchand**, S. Hutinet, F. Larvor, E. Baéza, B. Le Bizec, G. Dervilly, R. Cariou
- P-10 Temporal and spatial trends of CPs and OPFRs in black-tailed gull eggs  
G. Choo, O.K. Epke, **Jeong-Eun Oh**
- P-11 Spatial and temporal trends of hexabromocyclododecanes (HBCDDs) in multiple environmental matrices from a semi-enclosed bay, Korea  
**Trang Thi Thu Nguyen**, H.-K. Lee, C.-H. Lee, H.-B. Moon
- P-12 Finding the species vulnerable to polybrominated biphenyl ethers (PBDEs) in freshwater  
**Jinhee Park**, Y. Choi, K.W. Kim, S.D. Kim
- P-13 Polybrominated biphenyl ethers, novel brominated flame retardants and other POPs in mosses across the Northern borders of Greece  
**Athanasios Basis**, V. Siopi, D. Balla, E. Tsakiri, A. Ioannidou, C. Samara, D. Voutsas

### Flame retardants in biota/abiotic environments

- P-14 Nationwide survey of legacy and novel halogenated flame retardants in sediment and bivalves from Korean coastal waters  
H.K. Lee, J.E. Lim, **Hyo-Bang Moon**

## POSTER SESSION

### Flame retardants in consumer products

- P-15 Trends in flame retardant levels in consumer products after regulatory action  
**Ranjit Gill**, D. Tarrant, R. Sarala, M. Wang, M. Petreas, J.S. Park

### Human exposure

- P-16 Polybrominated biphenyl ethers in human milk of Croatian mother and matched house dust samples  
**Karla Jagić**, M. Dvorščak, D. Klinčić
- P-17 Multiple exposure assessment of polybrominated diphenyl ethers (PBDEs) in indoor dust, air, diet, and human serum from family-based populations  
**Jin-Su Oh**, J-E. Lim, H.-B. Moon
- P-18 Dechlorane plus and related compounds in human adipose tissue from France  
R. Cariou, E. Ghelli, T. Gazzotti, **Philippe Marchand**, B. Le Bizec, G. Dervilly

### Organophosphate flame retardants/health effects

- P-19 Biotransformation of tris(1-chloro-2-propyl) phosphate (TCIPP) and tris(P-tert-butylphenyl)phosphate (TTBPP) in human liver microsomes  
**Fatima den Ouden**, A. Estevez Danta, L. Belova, C. Gys, M. Roggeman, N. Van Wichelen, G. Poma, A. Covaci
- P-20 Implementation of class-based methods at DNTP to address the challenges of assessing health effects of flame retardants  
**Kristen Ryan**, H.T. Hogberg, J.-H. Hsieh, K. Mansouri, S. Mehta, G. Roberts, A. Rooney, V. Sutherland, K. Taylor, S. Witchev, N. Walker

## POSTER SESSION

### Organophosphate flame retardants

- P-21 Occurrence, transformation and risk assesment of organophoshate flame retardants in major rivers of Korea  
**Yeowool Choi**, J. Park, S.D. Kim
- P-22 Organophosphate tri-esters and di-esters in water and sediment from a highly industrialized lake of Korea  
**Jae-Eun Lim**, H.B. Moon

### Remediation/destruction techniques

- P-23 Biomonitoring of workers during remediation and demolition of PCB-contaminated apartment buildings  
**Stephanie Hammel**, M. Frederiksen

### Risk assessment

- P-24 Overview of existing flame retardants assessed under Canada's chemicals management plan  
**Elizabeth Verberne**, L. MacKinnon, A. Zidek

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