University of Birmingham

Professor Stuart Harrad

Professor of Environmental Chemistry

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About

Stuart is an environmental chemist whose research addresses all aspects of the environmental sources, fate and behaviour of persistent organic pollutants (POPs). He has particular interests in human exposure to POPs with a focus on indoor pathways. He is also active in research that explores the environmental forensics utility of chirality.

Biography

Professor Harrad gained his BSc in Applied Chemistry from **De Montfort University (http://www.dmu.ac.uk/)** in 1984. He then moved to the **University of East Anglia (http://www.iuea.ac.uk/)** where he completed an MSc in Analytical Chemistry in 1985, and his PhD on Levels and Sources of PCDD/Fs in UK soils in 1989. After several postdoctoral appointments in both the USA and UK, he took up his present post in September 1994. He heads a National Network on **Persistent Organic Pollutants (http://www.gees.bham.ac.uk/research/projects/nercpops/index.shtml)**, sits on the International Advisory Board of the Annual International Symposia on Halogenated Persistent Organic Pollutants and chaired the **28th such symposium in Birmingham (http://www.dioxin20xx.org/pdfs/History/Dioxin2008.pdf)**, August 17-22, 2008.

Teaching

Stuart makes a significant contribution to the delivery of the BSc Environmental Science degree programme. He is module leader for:

- GGM221 Environmental Transfer Processes, and
- GGM341 Environmental Protection

He contributes to GGM109 Environmental Chemistry and Physics

He teaches on several other MSc programmes both within and external to GEES

Postgraduate supervision

Research Students since 2001

Dan Drage (NERC Open Competition CASE award with Corus) - Evaluating Sources of Brominated Micropollutants within the Steel-Making Process

Dr Tim Evans (NERC CASE award with Corus) - investigating the utility of the enantiomeric ratios of atropisomeric PCBs in atmospheric source apportionment and other aspects of their biogeochemical cycling

Dave Darlow - Source Apportionment of Atmospheric SOC Emissions from the Steel Industry (NERC Industrial CASE award with Corus)

Dr Sadegh Hazrati - Investigating the Significance of Indoor Air as a Source of Human Exposure to PBDEs and PCBs (Iranian Ministry of Health)

Catalina Ibarra de Moore - Investigating the origins of elevated human body burdens of PBDEs (Mexican Government)

Dr Mohamed Abdallah - Investigating the Sources and Magnitude of Exposure to Brominated Flame Retardants (Egyptian government)

Stuart Hunter – Environmental Fate and Behaviour of Polybrominated Diphenyl Ethers and Polychlorinated Biphenyls in the Urban Environment (NERC Quota award)

Dr Arsalan Jamshidi – Chiral Signatures of Polychlorinated Biphenyls as a Tool for Understanding their Environmental Sources, Fate and Behaviour (Iranian Ministry of Health)

Dr Matt Robson – Utilising Chiral Signatures of Polychlorinated Biphenyls as an Atmospheric Source Apportionment Tool (NERC Quota award)

Dr Emma Goosey - Towards Understanding the Fate of Perfluoroalkyl Compounds (PFCs) within Urban Environments: Implications for Human Exposure (NERC Open Competition CASE award with Unilever)

Dr. Dudsadee Muenhor - Investigating the environmental fate and behaviour of Persistent Organic Pollutants (Thai government)

Jennifer Desborough - Exploring the Utility of Chiral Signatures to Further Understanding of Soil-to-Herbage Transfer of Polychlorinated Biphenyls and Hexabromocyclododecanes (NERC Open Competition CASE Award with The Food Standards Agency)

Lindsay Bramwell - Diet and indoor environments as predictors of human body burden of PBDE (NERC CASE award with Newcastle University and CASE partner Food and Environmental Research Agency (FERA))

Iryna Labunska - Emissions of Persistent Organic Pollutants from E-waste Handling in Developing Countries(self-funded)

Congqiao Yang – Environmental fate and behaviour of Persistent Organic Pollutants in English Lakes (University of Birmingham, China Scholarship Council and CEFAS)

Sandra Brommer – Assessment of Human Exposure to Organophosphorus flame retardants (University of Birmingham and FERA)

Wiiliam Stubbings – Emissions of Brominated Flame Retardants Associated with the Treatment of Waste Electronics, Furnishings and Building Materials (NERC Open Competition CASE award with AEA Technology)

Cassie Rauert - Elucidating pathways via which brominated flame retardants migrate from products into indoor dust (EU-funded under the INFLAME Marie Curie Initial Training Network)

Research

Persistent organic pollutants (POPs), particularly polychlorinated biphenyls (PCBs), organophosphorus flame retardants (OPFRs), polybrominated diphenyl ethers (PBDEs), perfluorinated substances (PFSs), hexabromocyclododecanes (HBCDs), "novel" brominated flame retardants (NBFRs) and dioxins. Specific foci are:

- Assessment of human exposure;
- The significance of indoor contamination;
- The exploitation of the chiral properties of POPs to provide new insights into their sources, environmental fate and behaviour

Current Research:

- Utilising the Chiral Properties of POPs as a Tool for Furthering Understanding of their Environmental Sources, Fate and Behaviour
- Assessing Human Exposure to POPs both internal (e.g. human milk, blood) and external via inhalation, dust ingestion, and diet
- Elucidating pathways via which brominated flame retardants migrate from products into indoor dust (part of the **INFLAME project (/research/activity/inflame/index.aspx)** "Indoor Contamination with Flame Retardant Chemicals: Causes and Impacts"
- Environmental fate and behaviour of POPs in UK lakes
- Emissions of brominated micropollutants from steel making
- Emissions of Brominated Flame Retardants Associated with the Treatment of Waste Electronics, Furnishings and Building Materials

Past and present funding for Dr Harrad's research programme comes from: AEA Technology, the Big Lottery Fund, the European Commission, the European Science Foundation, the Food Standards Agency, the Natural Environment Research Council (NERC), the Biotechnology and Biosciences Research Council (BBSRC), the Leverhulme Trust, the Royal Society, Corus plc, Unilever, Defra, the Department of Health, the West Midlands Office of the National Health Service Executive, and the Association of Commonwealth Universities. At any one time, Dr. Harrad's research group usually contains a number of overseas PhD students sponsored by government agencies within their own countries. Examples of such countries are: China, Egypt, Germany, Thailand, Iran, Mexico, Australia and Brunei. The Harrad group also welcomes research visitors from overseas, with previous visitors from countries such as Spain, Sri Lanka and Puerto Rico making an important contribution to our research.

Publications

Key publications since 2001

See a full list of publications (PDF - 158KB) (/Documents/college-les/gees/staff/harrad-publications.pdf)

J. Desborough, **S. Harrad** "Chiral Signatures Show Volatilization from Soil Contributes to Polychlorinated Biphenyls in Grass", *Environmental Science and Technology*, 45, 7354-7357 (2011)

M. Abdallah, **S. Harrad.** "Tetrabromobisphenol-A, Hexabromocyclododecane and Its Degradation Products in UK Human Milk: Relationship to External Exposure", *Environment International*, 37, 443–448 (2011)

S. Harrad, E. Goosey, J. Desborough, M. A-E. Abdallah, L. Roosens, A. Covaci. "Dust from UK primary school classrooms and daycare centers: The significance of dust as a pathway of exposure of young UK children to Brominated Flame Retardants and Polychlorinated Biphenyls", *Environmental Science and Technology* 44, 4198–4202 (2010).

S. Harrad, C. A. de Wit, M. A-E. Abdallah, C. Bergh, J. A. Björklund, A. Covaci, P. O. Darnerud, J. de Boer, M. Diamond, S. Huber, P. Leonards, M. Mandalakis, C. Östman, L. Småstuen Haug, C. Thomsen, T. F. Webster "Indoor Contamination with Hexabromocyclododecanes, Polybrominated Diphenyl Ethers and Perfluoroalkyl Compounds: An Important Exposure Pathway for People?", *Environmental Science and Technology*, 44, 3221–3231 (2010).

M. A.-E. Abdallah, **S. Harrad** Modification and calibration of a passive air sampler for monitoring vapor and particulate phase brominated flame retardants in indoor air: application to car interiors. *Environmental Science and Technology* 44, 3059–3065 (2010).

H-J. Lehmler, **S. J. Harrad**, H. Hühnerfuss, I. Kania-Korwel, C. M. Lee, Z. Lu, C. S. Wong "Chiral Polychlorinated Biphenyl Transport, Metabolism and Distribution – A Review", *Environmental Science and Technology*, 44, 2757–2766 (2010).

S. Harrad, M. A. Abdallah, N. L. Rose, S. D. Turner, T. A. Davidson "Current-Use Brominated Flame Retardants in Water, Sediment, and Fish from English Lakes", *Environmental Science and Technology*, 43, 9077–9083 (2009)

M. A. Abdallah, **S. Harrad**, A. Covaci "Isotope Dilution Method for Determination of Polybrominated Diphenyl Ethers using Liquid Chromatography Coupled to Negative Ionization Atmospheric Pressure Photoionization Tandem Mass Spectrometry: Validation and Application to House Dust", *Analytical Chemistry*, 81, 7460–7467 (2009)

L. Roosens, M. Abdallah, **S. Harrad**, H. Neels, A. Covaci "Exposure to Hexabromocyclododecanes via Dust Ingestion, but not Diet, Correlates with Concentrations in Human Serum", *Environmental Health Perspectives*, 117, 1707-1712 (2009)

T. F. Webster, **S. Harrad**, J. R. Millette, R. D. Holbrook, J. M. Davis, H. M. Stapleton, J. G. Allen, M. D. McClean, C. Ibarra, M. A. Abdallah, A. Covaci "Identifying transfer mechanisms and sources of decabromodiphenyl ether (BDE 209) in indoor environments using environmental forensic microscopy", *Environmental Science and Technology*, 43, 3067-3072 (2009). This paper is subject of a news story (see **http://pubs.acs.org/doi/full/10.1021/es900669w (http://pubs.acs.org/doi/full/10.1021/es900669w)**)

Expertise

People's exposure to persistent toxic organic chemicals e.g. via inhalation and ingestion of dust and food; measuring levels of these chemicals; sources of persistent toxic chemicals, particularly in indoor environments

Expertise

Exposure to persistent toxic organic chemicals, inhalation and ingestion of dust and food; measuring levels of these chemicals; sources of persistent toxic chemicals, particularly in indoor environments

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