# Analysis, Environmental Profile and Sources of POPs

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Hangzhou Institute of Advanced Study, CAS
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# Outline

- Our group
- Research Interests
- Techniques related to POPs
- Opportunities

# Our group


## Guorui LIU, Professor

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http://hias.ucas.ac.cn/hjxy/info/1014/1067.htm


- **207 papers including Nat. Sustain., Nat. Commun., ES&T, etc.**
- **15 Research projects from NSFC, MEE, etc.**
- **Young Scientist Award at the 13th ISPTS in Leipzig, Germany**
- **Excellent Mentor Award of the Chinese Academy of Sciences**

**Academic Appointments**

- Feb. 2025 – Present

Professor, College of Geography and Environmental Sciences, Zhejiang Normal University (ZNU)

- Jul. 2020 – now

Professor, Hangzhou Institute of Advanced Study (HIAS), Chinese Academy of Sciences (CAS)

- Jan. 2007 – Feb. 2025

Research Center for Eco-Environmental Sciences (RCEES), CAS

- Dec. 2013 – Dec. 2015

Hong Kong Baptist University

## Group:

**ZNU**: 1 assistant professor, 4 master and 1 Ph.D students

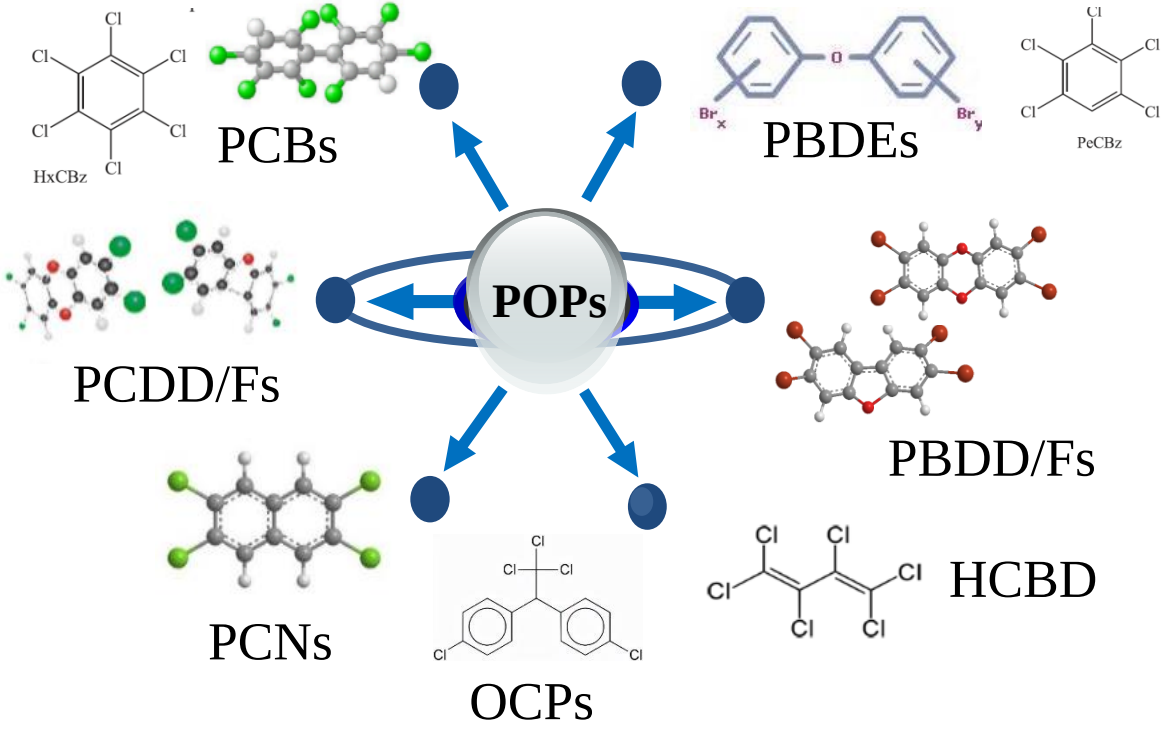
**HIAS**: 12 master students, 1 Ph.D student and 1 postdoc

**RCEES**, CAS, 3 Ph.D students

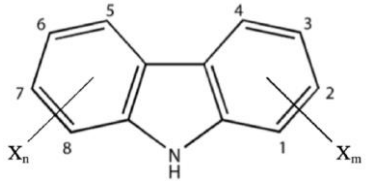
Total: 24 persons

# Research Interests-target pollutants

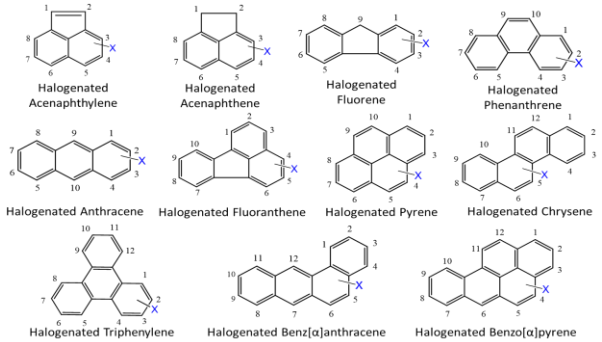
## Stockholm Convention POPs




## New POPs

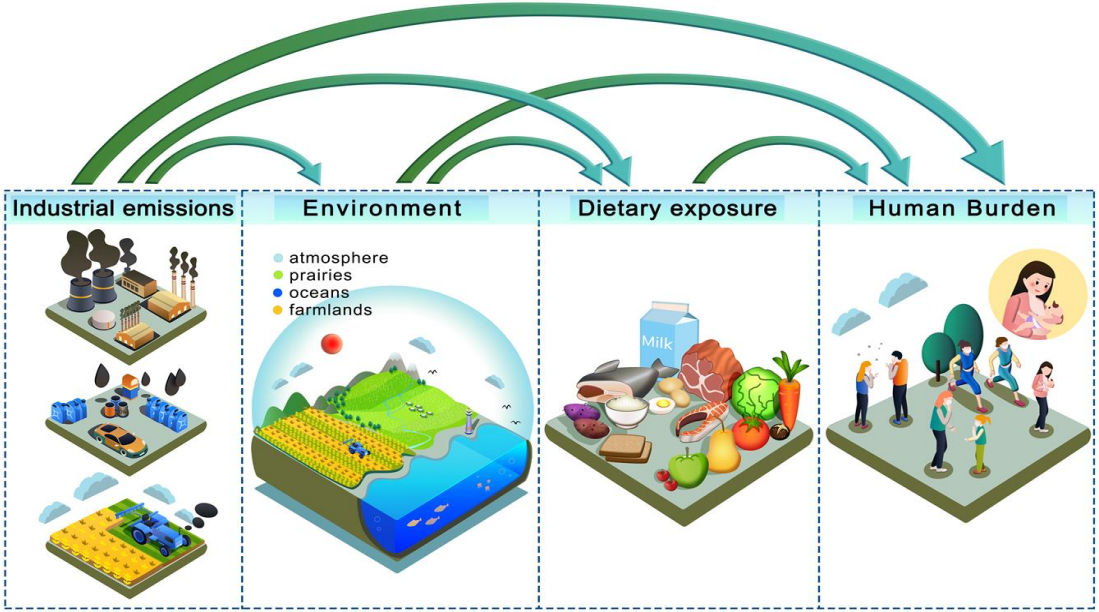


Polyhalogenated carbazoles (PHCZ)




PAHs and Halogenated PAHs

# Research Interests and opportunities




- Source emission and control of dioxins and dioxin-like POPs (PCBs, PCNs, HCBD);
- Levels and profile of dioxins, PCBs, PCNs, HCBD and OCPs in air, soil, sediment and biota;
- PCNs and other POPs in eight categories of dietary food (fish, meat, eggs, milk, legumes, cereals, vegetable, potatoes);
- PCNs and other POPs in human milks.

**Sources**

*Nat. Comm. 2024, 15, 10895*
*Nat. Comm. 2024, 15: 4737*
*Nat. Comm. 2023, 14: 3740*
*ES&T. 2020, 54, 842*
*ES&T. 2018, 52, 7334*
*ES&T. 2014, 48, 13165.*
*ES&T. 2010, 44, 8156.*
*ES&T. 2009, 43, 9196.*

**Environment**

*Nat. Comm., 2024, 15: 10827*
*ES&T, 2020, 54, 2314*
*Environ Int. 2020, 137, 105574*
*Environ Sci Eur 2020, 32: 96*

**Food**

*ES&T, 2022, 56, 5520*
*JAFC, 2024, 72, 773*
*Food Chem. 2024, 458, 140241*

**Human**

*ES&T, 2021, 55, 6804.*
*Environ. Int. 2020, 136, 105436.*
*Sci Total. Environ. 2024, 951, 175733*

# Techniques related to POPs

## Isokinetic sampling for Stack gas

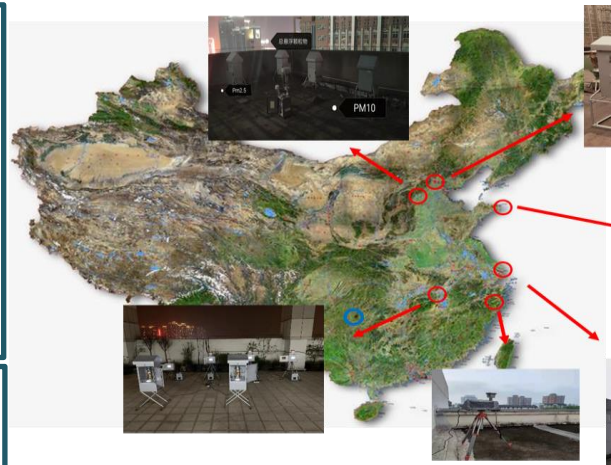
Filed sampling

| Categories | Industrial sources | Num. of plants |
|---|---|---|
| Waste Incineration | MSWI | 6 |
| | MWI | 3 |
| | Burning metal wires | 2 |
| | Small rural waste incinerators | 2 |
| Ferrous Metal Production | Iron sintering | 9 |
| | Arc furnace | 2 |
| | Iron casting | 14 |
| | Hot dip galvanizing | 4 |
| | Coking plants | 11 |
| Secondary Metal Production | Secondary Cu smelting | 12 |
| | Secondary Al smelting | 6 |
| | Secondary Zn smelting | 3 |
| | Secondary Pb smelting | 3 |
| Primary Metal Production | Primary Mg smelting | 2 |
| | Primary Cu smelting | 2 |
| Mineral Products | Cement Production | 2 |
| | Cement kiln co-processing solid wastes | 4 |
| Production and Use of Chemicals and Consumer Goods | Pulp and paper production | 2 |
| **Total** | **18 industrial sources** | **89 plants** |
| | **285 stack gas+109 fly ash** | |

*ES&T. 2018, 52, 7334; ES&T. 2014, 48, 13165.; ES&T. 2009, 43, 9196.*

# Air sampling in cities or remote area

cascade impactor





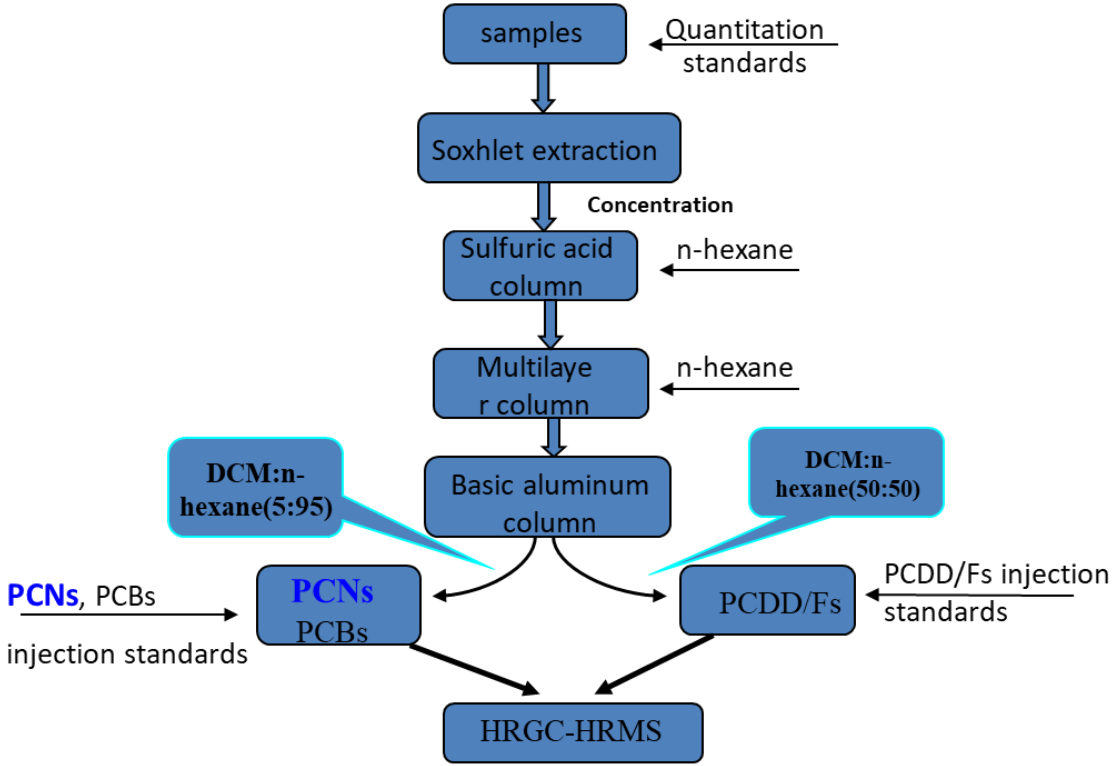


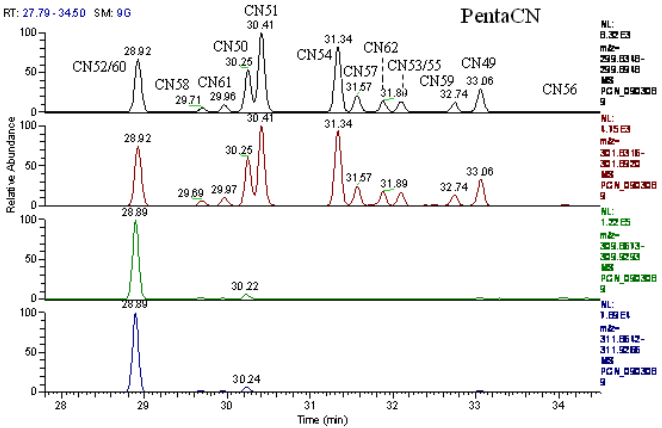

*Nat. Comm., 2024, 15: 10827*
*Environ. Pollut. 231, 2017, 1601*

High Volume


Personal exposure sampler


# Isotopic dilution GC/MS method for POPs analysis

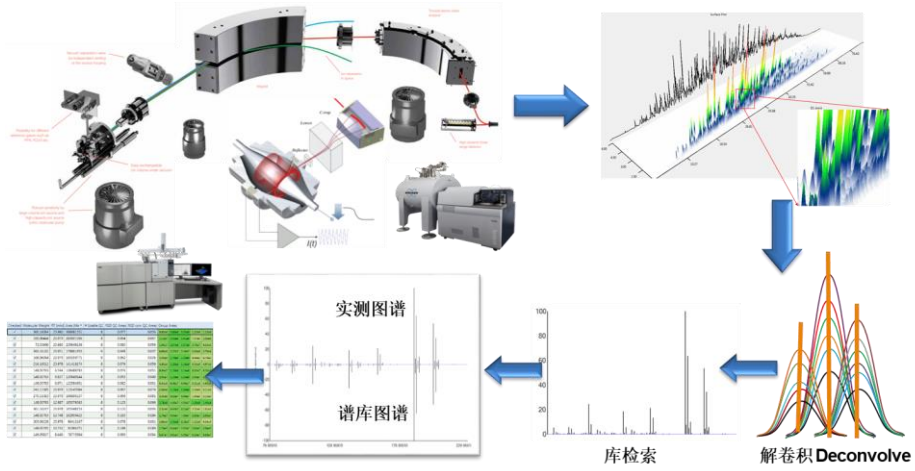


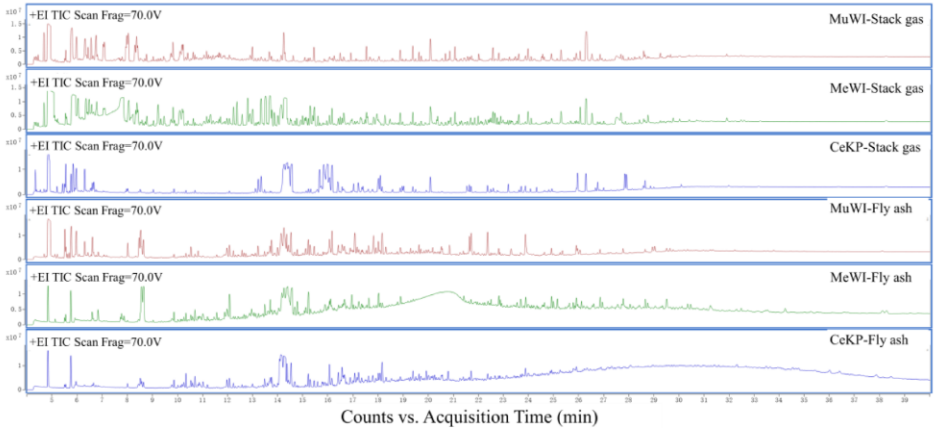




All unintentional POPs (dioxins, PCBs, PCNs, HCBD, HxCBz, PeCBz, ---)
OCPs in air, soil, sediment, biota and so on.

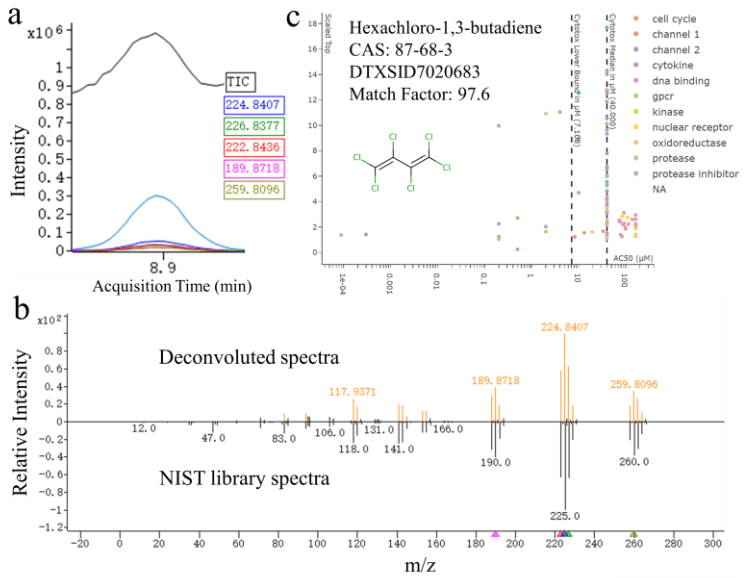
Journal of Chromatography A, 1509 (2017) 114–122
Rapid Commun Mass Spectrom. 2022;36:e9324.

# Screening of organic pollutants by HRMS




## GC-qTOF MS, GC-Orbitrap MS, FT-ICR MS




Many of the identified pollutants display much higher toxicity than that of TCDD or BaP.

*Sci Total Environ 664 (2019) 107–115*
*JHM, 428 (2022) 128220*
*JHM,406 (2021) 124603*

# Opportunities

Communication and collaborations are warmly welcomed.

Possible collaboration areas with selected institutes:

1. Capacity for POPs analysis: training for sampling, pretreatment and instrumental analysis.
2. Samples sharing for POPs analysis: larger sample number for study of POPs monitoring.
3. POPs analysis in our lab and data sharing.
4. Exchanges and visits

# Thanks for your attention !

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