Ying Xiong, Ph.D.

Department of Climate and Space Sciences and Engineering, University of Michigan-Ann Arbor

RESEARCH INTERESTS

Air Quality, Environmental Monitoring, Global Health, Chemical Transport Model, Environmental Justice, and Big Data Analysis and Application

EDUCATION

University of Calgary, Canada May 2021

Ph.D. in Environmental Engineering (Atmospheric Chemistry), GPA: 4.0/4.0

Dissertation: Optimization of A Volatile Organic Compound (VOC) Control Strategy in Eight Cities of Western Canada by Multi-Effects Evaluation

Supervisor: Dr. Ke Du

Wuhan University of Technology, China July 2017

M.Sc. in Environmental Science and Engineering, GPA: 88.4/100, Ranking: Top 1 in 37

Dissertation: Seasonal and Spatial Differences in Source Contributions to $PM_{2.5}$ in Wuhan, China

Supervisor: Dr. Jiabin Zhou

Wuhan University of Technology, China July 2014

B.S. in Environmental Science, GPA: 89.1/100, Ranking: Top 4 in 52

ACADEMIC EXPERIENCE

Dr. Eric A. Kort Group, University of Michigan, Ann Arbor, USA

Research Fellow July 2023 – present

- Methane Emissions from the Oil and Gas Industry in the US: Evaluating the Impact on Climate Change
    - Develop an observation-based approach that can be widely used to determine methane emissions from each segment of the oil and gas industry.
    - Estimate the climate effect of current operations in the Gulf of Mexico.
    - Project future climate benefits of reducing methane emissions from the O&G industry in the US.

  Contribution: Programming, GEOS-Chem model simulation, data analysis, presentation and writing.

HUman health, Air quality, and Climate ChaNGe (HUANG) Lab, Wayne State University, Detroit, USA

Postdoctoral Fellow September 2021 – June 2023

- Quantifying Long-Term Trends of Impacts of Global Gasoline and Diesel Emissions on Air Quality and Human Health (Funded by a Postdoctoral Fellowship from the Office of Vice President for Research at Wayne State University) (**Environ. Res. Lett**)
    - Estimated global total emissions of aerosols and criteria air pollutants from gasoline and diesel sectors based on the Community Emission Data System (CEDS) anthropogenic emission inventories.
    - Performed NCAR Community Earth System Model (CESM)-Community Atmosphere Model with Chemistry (CAM6-Chem) simulations for characterizing long-term trends of surface aerosols and precursor' concentrations.

- Validated model simulated $PM_{2.5}$ and O_3 concentrations against ground-based observations.
- Quantified $PM_{2.5}$- and O_3-induced exposure inequities between the developed and developing countries.
- Presented results at the 2021 American Geophysical Union (AGU) Fall Meeting. (New Orleans, LA)

Contribution: Programming, CESM CAM6-Chem model simulation, data analysis, presentation and writing.

- Assessing Global Cancer Burdens Associated with NMVOC Exposure from 2000-2019: Implication for Health Disparity and Environmental Injustice
  - Investigated long-term trends in global and regional NMVOC emissions and their driving sectors based on the CEDS emission inventory.
  - Performed CESM CAM6-Chem model simulations and model validation.
  - Estimated lifetime inhalation cancer risk (LICR) and cancer burdens induced by NMVOC exposure for 194 countries worldwide during 2000-19.
  - Highlighted the persistent environmental inequality in air pollution exposure among four income countries: low-, low-middle-, upper-middle-, and high-income countries.
  - Presented results at the 2022 American Geophysical Union (AGU) Fall Meeting. (Chicago, IL)

  Contribution: Programming, CESM CAM6-Chem model simulation, data analysis, presentation and writing.
- Elucidating O_3 Pollution in Southeast Michigan Using MOOSE Observations and F0AM Simulations (Funded by National Science Foundation: AGS-2126097)
  - Collected ambient nitrous acid (HONO) samples from southeast Michigan during the Michigan-Ontario Ozone Source Experiment (MOOSE) in the summer of 2022.
  - Characterized temporal variations of O_3 and its precursors in southeast Michigan.
  - Employed zero-dimensional box model (F0AM) and HYSPLIT transport model to elucidate contributions of O_3 chemistry and long-range transport sources to O_3 pollution in southeast Michigan, respectively.
  - Presented results to the MOOSE team, 2022 AGU Fall Meeting and submitted a manuscript to J. Geophys. Res. Atmospheres.

  Contribution: Field observation, model simulations, data analysis, writing, and presentation.

Air Pollution and Environmental Monitoring (APEM) Lab, University of Calgary, Calgary, Canada

Graduate Research Assistant September 2017 - May 2021

- Characterizing Emission Sources and Health Risks of Ambient Volatile Organic Compounds (VOCs) in Western Canada (Funded by China Scholarship Council) (Sci. Total Environ, Chemosphere, ES&T)
  - Developed a methodology to quantitatively estimate mitigation goals for air pollution sources.
  - Collected VOC samples from multiple sites in Calgary during 2018-2019.
  - Employed a receptor model (Positive Matrix Factorization, PMF) and spatial analysis tools to identify major sources of VOC in western Canada.
  - Assessed chronic non-cancer- and cancer-associated risks due to inhalation exposure to ambient VOC.
  - Presented results at the 112th Air & Waste Management Association Annual Conference. (Quebec City, QC)

  Contribution: Funding acquisition, field sampling, lab experiment, model simulation, writing, and presentation.
- Investigating Source-Resolved Attribution of O_3 and Secondary Organic Aerosol (SOA) Formation Potential from VOC Emissions in Vancouver and Calgary (Funded by China Scholarship Council and University of Calgary) (Sci. Total Environ, Environ. Res)
  - Elucidated the role of VOC abundance and reactivity in producing O_3 and SOA.

- Apportioned O_3 and SOA formation to individual VOC sources.
- Identified emission source maps for VOC, O_3, and SOA.
- Presented an invited talk at Harvard University and 2020 AGU Fall Meeting. (online)

Contribution: Funding acquisition, model simulation, presentation, and writing.

- Evaluating and Calibrating Low-Cost Sensor (LCS) in Ambient Conditions Using Machine-Learning Methods (Funded by Natural Sciences and Engineering Research Council of Canada) (Atmos. Meas. Tech)
  - Assembled low-cost $PM_{2.5}$ sensors (model: Plantower PMS5003) and built monitoring systems in Calgary.
  - Identified data gaps and applied machine learning techniques (XGBoost and neural network) to calibrate questionable measurements.
  - Provided the local community with free LCS to increase public awareness of air quality and human health.

  Contribution: Sensor installation and maintenance, data acquisition, and writing.

School of Resource and Environment Engineering, Wuhan University of Technology, Wuhan, China

Graduate Research Assistant September 2014 - July 2017

- Chemical Characterization, Source Apportionment, and Oxidative Potential of $PM_{2.5}$ in Urban Areas of Wuhan (Funded by National Natural Science Foundation of China and Wuhan University of Technology) (Sci. Total Environ 1, Sci. Total Environ 2, Environ. Pollut)
  - Analyzed filter-based $PM_{2.5}$ samples collected from industrial, traffic, and background areas of Wuhan using the Gas Chromatography–Mass Spectrometry. (GC-MS)
  - Performed receptor modeling to apportion $PM_{2.5}$ mass to different sources.
  - Estimated the impact of long-range transported sources on $PM_{2.5}$ concentrations in Wuhan.
  - Determined oxidative potential of ambient $PM_{2.5}$ in Wuhan and compared it with other eight areas of China.

  Contribution: Chemical analysis, model simulation, and writing.
- Characterizing and Souring $PM_{2.5}$ over Key Emission Regions in China (Funded by National Natural Science Foundation of China) (Atmos. Environ)
  - Chemical analysis of organic carbon (OC) in ambient $PM_{2.5}$ samples obtained from four key emission regions: Beijing-Tianjin-Hebei (BTH), Yangzi River Delta (YRD), Pearl River Delta (PRD), and Sichuan Basin. (SB)
  - Applied molecular marker-Chemical Mass Balance (CMB) model to estimate primary contributors to $PM_{2.5}$.

  Contribution: Lab experiment, model simulation, and writing.

RESEARCH GRANTS

1. Investigating Air Quality and Health Effects of Regional and Global air pollution; 08/01/2021 - 07/31/2023; **Postdoctoral Fellowship from the Office of Vice President for Research at Wayne State University**; co-PI: **Ying Xiong** (PI: Dr. Yaoxian Huang); $60,000
2. Characteristics, Sources, and Health Risks of Ambient Volatile Organic Compounds (VOCs) in Western Canada; 08/26/2017 - 08/25/2021; **China Scholarship Council**; PI: **Ying Xiong** (co-PI: Dr. Ke Du); $75,000
3. Source-Resolved Attribution of O_3 and Secondary Organic Aerosols (SOA) Formation in Calgary; 10/12/2017 - 04/10/2020; **University of Calgary**; PI: **Ying Xiong (**co-PI: Dr. Ke Du**)**; $6,000
4. Identifying Potential Causes of Elevated $PM_{2.5}$ Concentration in Wuhan, China; 09/01/2015 – 08/30/2016; **Wuhan University of Technology**; PI: **Ying Xiong** (co-PI: Dr. Jiabin Zhou); $2,000

PEER-REVIEWED PUBLICATIONS (* Corresponding Author)

ORCID | Google Scholar

1. **Xiong, Y.;** Huang, Y.; Du, K. (2022) "Health risk-oriented source apportionment of volatile organic compounds in eight Canadian cities and implication for prioritizing mitigation strategies". ***Environ. Sci. Technol.,*** Vol. 56 (17), pp: 12077-12085. (link)
2. **Xiong, Y.;** Partha, D; Huang, Y., et al. (2022) "Long-term trends of impacts of global gasoline and diesel emissions on ambient $PM_{2.5}$ and O_3 pollution and the related health burden". ***Environ. Res. Lett.,*** Vol. 17 (10), pp: 104042. (link)
3. **Xiong, Y.;** Zhou, J.; Xing, Z.; Du, K. (2021) "Cancer risk assessment for exposure to hazardous volatile organic compound in Calgary, Canada." ***Chemosphere,*** Vol. 272, pp: 129650. (link)
4. **Xiong, Y.;** Zhou, J.; Xing, Z.; Du, K. (2020) "Optimization of a volatile organic compound control strategy in an oil industry center in Canada by evaluating ozone and secondary organic aerosol formation potential." ***Environ. Res.***, Vol. 191, pp:110217. (link)
5. **Xiong, Y.;** and Du, K. (2020) "Source-resolved attribution of ground-level ozone formation potential from VOC emissions in Metropolitan Vancouver, BC". ***Sci. Total Environ.***, Vol. 721, pp: 137698. (link)
6. **Xiong, Y.;** Bari, M. A.; Xing, Z.; Du, K. (2020) "Ambient volatile organic compounds (VOCs) in two coastal cities in western Canada: Spatiotemporal variation, source apportionment, and health risk assessment". ***Sci. Total Environ.***, Vol. 706, pp: 135970. (link)
7. **Xiong, Y.;** Zhou, J.; Schauer, J. J.; Yu, W.; Hu, Y. (2017) "Seasonal and spatial differences in source contributions to $PM_{2.5}$ in Wuhan, China". ***Sci. Total Environ.***, Vol. 577, pp: 155-165. (link)
8. Si, M.;[1] **Xiong, Y.;**[1] Du, S.; Du, K. (2020) "Evaluation and calibration of a low-cost particle sensor in ambient conditions using machine-learning methods". ***Atmos. Meas. Tech.***, Vol. 13, pp: 1693-1707. (Dual-first authorship, link)
9. Yuan, C.; Wang, Z.*, **Xiong, Y*.;** et al. (2023) "Assessing the impacts of CPM emissions on $PM_{2.5}$ source appointment of Wuhan, China". ***Fuel*** (link, Corresponding author)
10. Xing, Z.; Li, S.; **Xiong, Y.;** Du, K. (2021) "Estimation of aerosol flux into the Edmonton-Calgary corridor from satellite observation for the period from 2011 to 2017". ***Atmos Environ.***, Vol. 246, pp: 118084. (link)
11. Xing, Z.; **Xiong, Y.;** Du, K. (2020) "Source apportionment of airborne particulate matters over the Athabasca oil sands region: Inter-comparison between PMF modeling and ground-based remote sensing." ***Atmos Environ.***, Vol. 221, pp: 117103. (link)
12. Liu, Q.; Lu, Z.; **Xiong, Y.;** Huang, F.; Zhou, J.; Schauer, J. J. (2020) "Oxidative potential of ambient $PM_{2.5}$ in Wuhan and its comparisons with eight areas of China". ***Sci. Total Environ.***, Vol. 701, pp: 134844. (link)
13. Lu, Z.; Liu, Q.; **Xiong, Y.;** Huang, F.; Zhou, J.; Schauer, J. J. (2018) "A hybrid source apportionment strategy using positive matrix factorization (PMF) and molecular marker chemical mass balance (MM-CMB) Models". ***Environ. Pollut.***, Vol. 238, pp: 39-51. (link)
14. Zhou, J.; **Xiong, Y.;** Xing, Z.; Deng, J.; Du, K. (2017) "Characterizing and souring ambient $PM_{2.5}$ over key emission regions in China II: Organic molecular markers and CMB modeling". ***Atmos Environ.***, Vol. 163, pp: 57-64. (link)

Note: [1] These authors contributed equally to this work.

MANUSCRIPTS UNDER REVIEW / IN PREPRATION

15. **Xiong, Y.;** Chai, J.; Huang, Y., et al. (2023) "Elucidating O_3 pollution in Southeast Michigan based on MOOSE field observations and F0AM 0-D box model." ***J. Geophys. Res. Atmos. (Under review: 2nd round)***
16. **Xiong, Y.;** Huang, Y.; Du, K. (2023) "Global trends in ambient volatile organic compounds emissions and associated

health burdens for 2000-2019". ***THE LANCET Planetary Health.*** **(To be submitted)**

17. **Xiong, Y.;** Zhou, J.; Xing, Z.; Huang, Y.; Du, K. (2023) "Estimation of anthropogenic VOC emission and corresponding impact on ozone and secondary organic aerosol formation potential in eight Canadian cities". ***Atmos. Chem. Phys.*** **(In Preparation)**
18. Partha, D.; **Xiong, Y.;** Huang, Y. (2023) "Long-term impacts of global solid biofuel emissions on ambient air quality and human health". ***Environ. Int.*** **(To be submitted)**
19. Salah, H.; Huang, Y.; **Xiong, Y.,** et al. (2023) "Global intercomparisons of emissions, air quality and human health impacts from CEDS, CAMS and ECLIPSEv6b". ***Environ. Int.*** **(In Preparation)**

INVITED TALKS

1. **University of Michigan**, Climate and Space Sciences and Engineering, Ann Arbor, USA. *Long-term Impacts of Urban Air Pollution on Atmospheric Chemistry and Human Health.* 07/05/2023.
2. **Southern University of Science and Technology**, School of Environmental Science and Technology, Shenzhen, China. *Learnings Obtained by Integrating Field Observations of Air Pollutants with Multi-Scale Modeling*, 03/20/2023.
3. **Nanjing University of Information Science & Technology**, School of Environmental Science and Technology, Nanjing, China. *Insights Gained from Field Observations of Air Pollutants and Multi-Scale Modeling*, 03/16/2023.
4. **Peking University**, College of Environmental Science and Engineering, Beijing, China. *Long -term trends of impacts of global gasoline and diesel emissions on air quality and human health for 2000-2015*, 12/18/2022.
5. **Beijing Normal University**, School of Environment, Beijing, China. *The impacts of global gasoline and diesel emissions on air quality and human health burdens for 2000-2015*, 12/15/2022.
6. **Aerodyne Research Inc**., Billerica, USA. *Elucidating O_3 Pollution in Southeast Michigan Based on MOOSE Observations and F0AM Simulations*, 07/25/2022.
7. **Wayne State University**, Department of Civil and Environmental Engineering, Detroit, USA. *Optimization of VOC Control Strategy in Eight Cities of Western Canada by Multi-Effects Evaluation*, 09/08/2021.
8. **University of Calgary**, Faulty of Graduate Studies, Calgary, Canada. *Cancer Risk Assessment for Exposure to Hazardous Volatile Organic Compounds (VOCs) in Calgary*, 02/26/2021.
9. **Harvard University,** Department of Earth and Planetary Sciences, Cambridge, USA. *Source-Resolved Attribution of O_3 and SOA Formation from VOC Emissions in Western Canada*, 08/13/2020. (link)
10. **Wuhan University of Technology,** Graduate School, Wuhan, China. *Use of Satellite Observation to Evaluate Transboundary Emissions of Fine Particle and its Implication for Air Quality Policies*. 10/04/2016.
11. **Wuhan University of Science and Technology,** College of Resource and Environmental Engineering, Wuhan, China, *Seasonal and Spatial Differences in Source Contributions to $PM_{2.5}$ in Wuhan*, 12/15/2015.

CONFERENCE PRESENTATIONS

1. **Xiong, Y.,** Huang, Y., Du, K. Global Trends in Ambient Volatile Organic Compounds Emissions and Associated Health Burdens for 2000-2019, AGU Fall Meeting 2022, Chicago, USA, 12/16/2022.
2. **Xiong, Y.,** Huang, Y., Steven Smith, et al., Long-term trends of impacts of global gasoline and diesel emissions on air quality and human health for 2000-2015, Atmospheric Chemical Mechanisms Conference 2022, University of California Davis, California, USA. 12/08/2022.
3. **Xiong, Y.,** Huang, Y., Steven Smith, et al. Impacts of global gasoline and diesel emissions on ambient $PM_{2.5}$ and O_3 pollution and the related human health burden for 2000-2015, 2022 Midwest Student Conference on Atmospheric

Research (MSCAR), University of Illinois Urbana-Champaign, Illinois, USA. 10/01/2022.

4. **Xiong, Y.** Cancer risk assessment for exposure to hazardous volatile organic compounds (VOCs) in Calgary, 2021 Peer Beyond Graduate Research Conference, Calgary, Canada, 02/26/2021. (**Engineering Faculty Award**, link)
5. **Xiong, Y.,** and Du, K. Source-resolved attribution of ground-level ozone formation potential from VOC emissions in Metropolitan Vancouver, BC, 2020 Mechanical and Manufacturing Engineering Graduate Student Conference, Calgary, Canada, 05/08/2020. (**Best Presentation Award,** link)
6. **Xiong, Y.,** Xing, Z., Du, K. Ambient volatile organic compounds (VOCs) in two coastal cities in western Canada: Spatiotemporal variation, Source apportionment, and Health risk assessment, A&WMA 112th Annual Conference, Québec City, Canada, 06/27/2019.

POSTER PRESENTATIONS

1. **Xiong, Y.,** Huang, Y., Chai, J., Yacovitch T., et al. Examining the Summertime Ozone Formation Regime in Southeast Michigan Using MOOSE Ground-Based HCHO/NO_2 Measurements and F0AM Box Model, Gordon Research Conference (GRC) Atmospheric Chemistry, Newry, USA, 8/1/2023.
2. Huang, Y., **Xiong, Y.,** Chai, J., et al. Elucidating ozone air pollution during the Michigan-Ontario Ozone Source Experiment (MOOSE) field campaign in 2021, AGU Fall Meeting 2022, Chicago, USA, 12/13/2022.
3. Partha, D., **Xiong, Y.,** Huang, Y., et al. Long-term Trends of Impacts of Global Solid Biofuel Emissions on Air Quality and Human Health during 2000-2019, AGU Fall Meeting 2022, Chicago, USA, 12/15/2022 (link).
4. Mariscal, N., Huang, Y., Emmons, L., **Xiong, Y.,** et al. Evaluation of Model Simulated Ozone and its Precursors Using High-Resolution Model Simulations during the Michigan-Ontario Ozone Source Experiment (MOOSE), AGU Fall Meeting 2022, Chicago, USA, 12/13/2022 (link).
5. Lee, T., Chai, J., **Xiong, Y.,** Huang, Y., et al. Isotopic investigation of NO_x and Ozone chemistry in Southeast Michigan under the influence of lake-land air recirculation), AGU Fall Meeting 2022, Chicago, USA, 12/13/2022 (link).
6. **Xiong, Y.,** Huang, Y., Du, K. Health risk-oriented source apportionment of volatile organic compounds in eight Canadian cities and implication for regional emission control, AGU Fall Meeting 2021, New Orleans, USA, 12/14/2021. (link)
7. Huang, Y., **Xiong, Y.,** Smith, S., et al. Long-term Trends of Impacts of Global Gasoline and Diesel Emissions on Air Quality and Human Health for 2000-2019, AGU Fall Meeting 2021, New Orleans, USA, 12/14/2021. (link)
8. **Xiong, Y.,** Zhou, J., Xing, Z., Du, K. Characterizing ozone and SOA formation potential from VOCs emissions in an oil industry center in Canada, AGU Fall Meeting 2020, online, 12/10/2020. (link)

TEACHING EXPERIENCE

Teaching Assistant, Wayne State University

- *Big Data Applications in Environmental Engineering* (CE7270) — Winter 2022

Duties: Lecture and lab preparations.

Teaching Assistant, University of Calgary

- *Introductory Dynamics for Energy Engineering* (ENER 240) — Spring 2019
- *Fundamentals of Fluid Mechanics* (ENME 341) — Winter 2019, 2020, 2021
- *Mechanics of Materials for Energy Engineering* (ENER 360) — Fall 2018, 2019, 2020
- *Mechanical Engineering Design Methodology and Application* (ENME 538) — Fall 2017

Duties: Lecture preparation, tutorials (on both assignments and labs), grading, and invigilation.

Teaching Assistant, Wuhan University of Technology

- *Modern Environmental Testing Technology* (ENEN 601) Winter 2015

Duties: Lab preparation, tutorial, and grading.

SUPERVISION

Wayne State University

- Debatosh Banik Partha, Ph.D. candidate in Civil and Environmental Engineering
- Halima Salah, Ph.D. candidate in Civil and Environmental Engineering
- Noribeth Mariscal, Ph.D. candidate in Civil and Environmental Engineering
- Like Wang, Ph.D. student in Civil and Environmental Engineering

University of Calgary

- Minxing Si, Ph.D. candidate in Mechanical and Manufacturing Engineering
- Ruoqi Deng, Ph.D. candidate in Mechanical and Manufacturing Engineering
- Zhangkang Li, Ph.D. candidate in Mechanical and Manufacturing Engineering

Wuhan University of Technology

- Baba Imoro Musah, Master candidate in Environmental Science and Engineering
- Chang Yuan, Master candidate in Environmental Science and Engineering
- Xuan Shao, Master candidate in Environmental Science and Engineering
- Kuan Li, Master candidate in Environmental Science and Engineering
- Fang Huang, Master candidate in Environmental Science and Engineering

AWARDS

"Atmospheric Chemical Mechanisms Conference Travel Award", University of California, Davis ($500)	2022
"College of Engineering Travel Award", Wayne State University ($500)	2022
"Postdoctoral Research Award", Wayne State University ($250)	2022, 2023
"Postdoctoral Travel Award", Wayne State University ($500)	2021
"Department Publication Award", University of Calgary ($750)	2021
"Engineering Faculty Award", University of Calgary ($250)	2021
"Professional Development Award", University of Calgary ($500)	2020
"Best Presentation Award", University of Calgary ($250)	2020
"Graduate Student Travel Award", University of Calgary ($750)	2019
"Dean's Entrance Award", University of Calgary ($6,000)	2017
"Distinguished Dissertation Award", Wuhan University of Technology ($600)	2017
"Excellent Graduate Student Award", Wuhan University of Technology ($400)	2017
"Chongqing Sage Foundation Scholarship", Wuhan University of Technology ($200)	2016
"2nd Presentation Award" at Annual Conference of Hubei Chemistry and Chemical Engineering Society ($100)	2015
"Outstanding Leadership Award", Wuhan University of Technology ($300)	2015 - 2016
"Excellent Undergraduate Award", Wuhan University of Technology ($200)	2014
"First-Class Professional Scholarship", Wuhan University of Technology ($5,000)	2011 - 2016

PROFESSIONAL SERVICE

Journal article reviewer

- Advances in Atmospheric Sciences
- Environmental Science: Atmospheres
- Science of the Total Environment
- Environmental Pollution
- Chemosphere
- International Journal of Hygiene and Environmental Health
- Atmosphere
- The Extractive Industries and Society

Membership

- America Geophysical Union (AGU) 2020 - present
- Air and Waste Management Association (A&WMA) 2019
- Chair of CPANS - University of Calgary Student Chapter (CPANS is a subsection of A&WMA) 2019

SKILLS

Programming language:	Python, R, IDL, MATLAB
Atmospheric modeling:	NCAR CESM CAM6-Chem, GEOS-Chem
Relevant Tool/Software:	ArcGIS, SPSS, CMB, PMF, HYSPLIT, TrajStat, Origin, and Photoshop
Working Platform/System:	Linux, Mac OS, Windows
Chemical instrumentation:	GC-FID/GC-MS, IC, TC

REFERENCES

Dr. Ke Du (Ph.D. supervisor)

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