MIN JANG

Ph.D./Analytical Chemistry

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Personal Statement

As a diligent and passionate researcher, I've acquired and applied diverse practical skills throughout my education and professional journey. Through experiences with prestigious institutions in analytical chemistry in the USA and a renowned research facility in the UK, I've honed my abilities in conducting scientific studies. These opportunities involved collaboration with leading global institutions boasting state-of-the-art facilities. Drawing from these experiences, I've expanded my expertise upon joining KRICT. My career aspiration extends beyond contributing to public and environmental safety through the application of my skills and research acumen. I aim to develop innovative methods in collaboration with professionals from various scientific disciplines on an international scale. Additionally, I aspire to mentor and nurture future experts passionate about analytical chemistry.

Education

PH.D. RESEARCH: On the Relevance of Detecting Drugs in a Fingerprint
University of Surrey – Guildford, UK (October 2015 – September 2019)

- Developed links with companies from various areas such as instrumentation (mass spectrometry) and chemicals (illicit substances).
- Established a collaboration with National Forensic Ireland (NFI), Intelligent Fingerprinting (UK) National Physical Laboratory (NPL, UK), Home Office (UK), Department of Science and Technology Laboratory (DSTL, UK) National Health Service (NHS, UK), and Ministry of Justice (UK).
- Supervised the achieving of ethical approval of this study through liaising with the relevant university department.
- Developed skills to run samples using various characterization instruments (LC-MS, paper spray-MS, ToF-SIMS, MALDI-MS, DESI-MS, LESA-MS, Raman spectroscopy, and immunolabelling).
- Contributed ideas and scientific data for the development of new methods to detect not only conventional drugs but also novel psychoactive substances (NPSs) in latent fingerprints and their significance.
- Presented my findings to wide audiences at international conferences.
- Managed the time and resources of the project to fit with the predicted time-frame.
- Led and supervised undergraduate students as they undertook various laboratory-based projects.
- Drafted several scientific articles for future publications in high-impact journals.

MASTER OF SCIENCE: Covert Identification of Drug Dealers and Terrorism Suspect through Trace Chemical Analysis of Latent Fingerprints
University of California Davis– Davis, CA, USA (October 2013 – June 2015)

- GPA: 3.29/4.0
- Criminalistics track (focus on forensic chemistry).
- Managed skills of ethical approval by handling all ethics-related documents for my research.
- Developed skills.
  - Prepared and tested samples for characterization using gas chromatography mass spectrometry (GC-MS).
  - Executed trace analysis testing with the relevant equipment.
  - Full experience in the fields of personal identification, crime scene investigation, court testimony, and scientific writing.

BACHELOR OF SCIENCE AND TEACHING DEGREE IN CHEMISTRY
Michigan State University- East Lansing, MI, USA (September 2007 – December 2012)

- GPA: 3.36/4.0
- Major in Human Biology.
- Member of FFS (future forensic scientist).

Work Experience

POST DOC. RESEARCHER
Bio-based Chemistry Center, Korea Research Institute of Chemical Technology (KRICT), Ulsan, Korea (January 2020 – Present)

- Developed a novel method to determine degradability of biodegradable plastics under the open system (natural condition) by developing qualitative and quantitative detection method of monomers, byproducts of biodegradable plastic degradation.
- Developed an extraction method of phthalate esters in water and soils and detection method for qualitative and quantitative analysis for standardization of bio-based chemical materials.
- Developed a method to qualitatively and quantitatively detect phthalate esters in kid's toys and biodegradable plastics (working on ISO standardization)
- Developed a method to qualitatively and quantitatively detect bisphenol A and bisphenol S in a single fingerprint transferred from physical contact with receipt papers using LC-MS.
- Developed a method to detect methanol qualitatively and quantitatively in hand sanitizers and other alcohol products (a part of KOLAS task for interracially granted certification for bio-based chemical materials) using GC-MS.
- Developed a method to detect toxic VOCs qualitatively and quantitatively from plastic incineration using GC-MS.
- Developed analytical methods to figure out the degradation pattern of biodegradable plastics using oligomers and monomers for their further reuse to synthesize biodegradable plastics (chemical recycling).
- Analyzed nutrition of taros grown with buried biodegradable plastics with my developed methods to determine toxicity of them possibly affecting taros.
- In charge of analytical instruments and their operation (LC-MS, GC-MS, GPC, FTIR, NMR, ICP-MS, IR-MS and particle analyzer).
- Participated in various government sponsored projects regarding biodegradation and eco-friendly materials

PH.D. RESEARCHER
Ion beam Centre, Department of Chemistry, and Department of Engineering - University of Surrey – Guildford, UK (October 2015 – September 2019)

- Developed a method to detect cocaine and heroin and their metabolites in fingerprint from drug using patients who were treated at NHS Drug Rehabilitation (IRAS ID: 142223, Title: Novel methods for secure, non-invasive drugs of abuse testing).
- Conducted research on the significance of drug detection in fingerprints.
  - Effect of handwashing.
  - Persistence with normal daily activities after contact of non-drug users.
  - Distinguishing between fingerprint samples of drug users and drug contact by mass spectrometry imaging analysis.
- Developed a method to detect novel psychoactive substances (NPSs) from drug abuse offenders in the prison collaborating with Ministry of Justice (UK) (NRC Ref: 2018-263, Title: Comparative evaluation of a drug testing method using sweat from fingerprints versus urine to test prisoners for drug use/misuse).
- Delivered oral presentations and technical reports for senior management.
- Collaborated with fingerprint and forensic related facilities such as National Forensic Ireland (NFI), Intelligent Fingerprinting (UK), Home Office (UK), and Department of Science and Technology Laboratory (DSTL, UK).
- Investigated age of latent fingerprints using endogenous compounds.

SCIENTIFIC RESEARCHER
University of California Davis– Davis, CA, USA (October 2013 – June 2015)

- Developed a qualitative method to detect dimethyl sulfone (Methylsulfonylmethane (MSM)) which is commonly used for a recipe to cook methamphetamine in fingerprints using GC-MS.
- Ethical approval granted from the University Institutional Review Board (IRB) via liaising with the relevant department.
- Delivered oral presentations and technical reports for senior management.

SCIENTIFIC RESEARCHER
Michigan State University- East Lansing, MI, USA (January 2011 – December 2012)

- Lab assistant in Food Science Department.
- Researched to find out the effect of black walnut powder against Aflatoxin and Norsolorinic acid on different media.

Recent Publications

First Author

- **Min Jang**, Minkyung Lee, Seonghyun Chung, Seul-A Park, Huijeong Park, Hyeonyeol Jeon, Jonggeon Jegal, Sung Bae Park, Dongyeop X Oh, Giyoung Shin, Hyojeong Kim. 2024. Ecotoxicity assessment oof additives in commercial biodegradable plastic product: Implications of sustainability and environmental risk. *Science of the Total Environment*. 931. 172903.
- **Min Jang**, Minkyung Lee, Hyemin Yang, Huichan Lee, Sungbae Park, Sung Yeon Hwang, Hyojeong Kim, Dongyeop X Oh, Jeyoung Park. 2023. Method to analyze phthalate esters from soft toys dissolving into water mimicking infant playing. *Chemosphere*. 330. 138695
- **Min Jang**, Hyemin Yang, Seul-A Park, Hye Kyeong Sung, Jun Mo Koo, Sung Yeon Hwang, Hyeonyeol Jeon, Dongyeop X Oh, Jeyoung Park. 2022. Analysis of volatile organic compounds produced during incineration of non-degradable and biodegradable plastics. *Chemosphere*. 303. 134946.
- **Min Jang**, Hyemin Yang, Giyoung Shin, Jun Mo Koo, Sung Yeon Hwang, Jeyoung Park, Dongyeop X Oh. 2022. Determination of Methanol in Commercialized Alcohol-based Hand Sanitizing and Other Similar Products using Headspace GC-MS. *Current Analytical Chemistry*. 18 (7), 1-7.
- **Min Jang**, Hyemin Yang, Huichan Lee, Kwang Seon Lee, Joo Yeon Oh, Hyeonyeol Jeon, Yong Sik Ok, Sung Yeon Hwang, Jeyoung Park, Dongyeop X Oh. 2022. A sensitive environmental forensic method that determines bisphenol S and A exposure within receipt-handling through fingerprint analysis. *Journal of Hazardous Materials*. 424. 127410.
- Catia Costa, **Min Jang**, Janella M de Jesus, Rory T Steven, Chelsea J Nikula, Efstathios Elia, Josephine Bunch, Allen Bellew, JF Watts, Steven Hinder, Melanie Bailey. 2021. Imaging mass spectrometry: a new way to distinguish dermal contact from administration of cocaine, using a single fingerprint. *Analyst*. 146 (12), 4010-4021.
- **Min Jang**, Catia Costa, Josephine Bunch, Brian Gibson, Mahado Ismail, Vladimir Palitsin, Roger Webb, Mark Hudson, Melanie Bailey. 2020 On the relevance of cocaine and benzoylecgonine detection in a fingerprint. *Scientific Reports*. 10 (1), 1-7.

Co-author

- Seul-A Park, Hyeonyeol Jeon, **Min Jang**, Semin Kim, Sung Yeon Hwang, Chae Hwan Hong, Jun Mo Koo, Dongyeop X Oh., Jeyoung Park. 2024. Cellulose nanofiber/bio-polycarbonate composites as a transparent glazing material for carbon sequestration. *Cellulose*, 1-17.
- Hyeri Kim, Giyoung Shin, **Min Jang**, Fritjof Nilsson, Minna Hakkarainen, Hyo Jung Kim, Sung Yeon Hwang, Junhyeok Lee, Sung Bae Park, Jeyoung Park, Dongyeop X Oh, Hyeonyeol Jeon, Jun Mo Koo. 2023. Toward Sustaining Bioplastics: Add a Pinch of Seasoning. *ACS Sustainable Chem. Eng.* 11(5), 1846-1856.
- Hojung Kwak, Hyeri Kim, Seul-A Park, Minkyung Lee, **Min Jang**, Sung Bae Park, Sung Yeon Hwang, Hyo Jeong Kim, Hyeonyeol Jeon, Jun Mo Koo, Jeyoung Park, Dongyeop X Oh. 2023. Biodegradable, Water-Resistant, Anti-Fizzing, Polyester Nanocellulose Composite Paper Straws. *Advanced Science.* 10 (1), 2205554.
- Sejin Choi, Hyeonyeol Jeon, **Min Jang**, Hyeri Kim, Giyoung Shin, Jun Mo Koo, Minkyung Lee, Hye Kyeong Sung, Youngho Eom, Ho-Sung Yang, Jonggeon Jegal, Jeyoung Park, Dongyeop X Oh, Sung Yeon Hwang. 2021. Biodegradable, Efficient, and Breathable Multi-Use Face Mask Filter. *Advanced Science*. 8 (6), 2003155.
- Ho-Sung Yang, Seungwan Cho, Minkyung Lee, Youngho Eom, Han Gi Chae, Seul-A Park, **Min Jang**, Dongyeop X Oh, Sung Yeon Hwang, Jeyoung Park. 2021. Preparation of sustainable fibers from isosorbide: Merits over bisphenol-A based polysulfon. *Materials & Design.* 198, 109284.
- Joanna Czerwinska, **Min Jang**, Catia Costa, Mark C Parkin, Claire George, Andrew T Kicman, Melanie J Bailey, Paul I Dargan, Vincenzo Abbate. 2020. Detection of mephedrone and its metabolites in fingerprints from a controlled human administration study by liquid chromatography-tandem mass spectrometry and paper spray-mass spectrometry. *Analyst.* 145 (8), 3038-3048.

Conferences

- Invited lecturer in the Korean Society of Analytical Sciences (2024)
- Invited lecturer for the PSK-INNOX section in the Polymer Society of Korea (2023)
- Global ESG forum by Nature and Korea University (2022)
- Poster and oral presentation accepted in 129th Korean Chemical Society (2022)
- Poster and oral presentation accepted in 128th Korean Chemical Society (2021)

- Oral presentation accepted in IFRG 2019 International Fingerprint Research Group (2019)
- Oral presentation accepted in ANZFSS 24th International Symposium on Forensic Sciences (2018).
- Oral presentation accepted in 2nd World Conference and Exhibition on Forensic Science (2018).
- Local Organizing Committee of the International Atomic Energy Agency (IAEA) meeting on Enhancing Nuclear Technologies to Meet the Needs of Forensic Science (2016).
- Poster in security science conference hosted by UK Defense Science and Technology Laboratory (2016).
- Presenter in security science conference hosted by UK Defense Science and Technology Laboratory (2015).

Skills

Technical skills

- Gas chromatography (GC)
- Liquid chromatography (LC)
- Mass spectrometry (MS)
- Paper spray
- Desorption electrospray Ionization (DESI)
- Time of flight secondary ion mass spectrometry (ToF-SIMS)
- Matrix-assisted laser desorption/ionization (MALDI)
- Gel permissible chromatography (GPC)
- Immunolabelling
- Liquid extraction surface analysis (LESA)
- Fourier transform infrared spectroscopy (FTIR)
- Nuclear magnetic resonance spectroscopy (NMR)
- Particle analyzer
- Raman Spectroscopy
- Isotope Ratio Mass Spectrometry

IT and other skills

- Proficient in the use of Microsoft Office
- Familiar with Matlab
- Familiar with Origin
- Full and clean driving license (South Korea, USA, and valid international driving license)

Languages

- Fluent English
- Native Korean
- Basic French

Awards

- PSK-INNOX Young Researcher Award by Polymer Society of Korea (2023).
- Runner up in University of Surrey FEPS (Faculty of Engineering and Physical Sciences) 3 minutes presentation competition (2017).
- 3 times Dean’s award (2011 spring, 2012 summer, and fall semester).
- Scholarship in 10th grade from the Department of Education, South Korea (2004).

Certificates and Licenses

- Associated member (AMRSC) of Royal Society of Chemistry (Ref: 593164)
- Certification of ISO/IEC 17025:2017 issued by KOTICA (Ref: 202103240041)
- Certification of Measurement Uncertainty issued by KOTICA (Ref: 202103240040)