

Hidetoshi KURAMOCHI / Visiting Professor / Division of Environmental Sciences
Department of Natural Environmental Studies / Material Cycling in the Environment /
Emission control of pollutants, Recycling engineering, Environmental chemistry
<https://www.nies.go.jp/researchers-e/100205.html>

Educational Activities

Collaborative Program with National Institute for Environmental Studies

Career Summary

1997: Doctor of Engineering, Department of Industrial Chemistry, Graduate School of Engineering, Tokyo Metropolitan University

1997-2001: Postdoctoral fellow, University of Tsukuba and Ibaraki University

2001: Researcher, National Institute for Environmental Studies (NIES)

2005: Senior Researcher, NIES

2010: Section Head, NIES

2014: Visiting Professor, Yokohama National University

2021: Deputy Director, Material Cycles Division, NIES

2021: Visiting Professor, Department of Natural Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo

Research Activities

1) Emission control of pollutants during waste treatment and recycling

We investigate the behavior of environmental pollutants such as Persistent Organic Pollutants (POPs) and nano/micro-plastics in waste treatment and recycling facilities using chemical analysis and monitoring methods. Furthermore, we measure their physicochemical properties and emissions to environmental media from waste products and recycled materials, and then develop factory-fate models to understand their behavior and suggest the countermeasures for reducing their emission to the environment.

2) Development of biomass-to-energy and CCUS (Carbon dioxide Capture, Utilization and Storage) technologies

Negative emission technologies (NETs) that remove and sequester CO₂ are essential to realize carbon neutrality by 2050 (reducing GHG emission to net zero). We develop NETs, especially, advanced biomass-to-energy (BtE) technologies with negative CO₂ emission. Our research interests are biomass pyrolysis/gasification followed by CCUS, combined systems of different biomass conversion technologies, chemical/bio-methanation, biochar, bioasphalt, etc.

3) Environmental recovery and renovation studies

Since the severe accident of Fukushima Dai-ichi nuclear power plant (FDNPP), we have investigated the behavior of radioactive cesium (r-Cs) during waste incineration of r-Cs-contaminated municipal solid waste and decontamination waste from decontamination activity. Simultaneously, we have developed biofuel production technologies. On the basis of both research activities, we develop BtE technologies and systems, which are able to deal with r-Cs-contaminated biomass, for environmental renovation of municipalities around FDNPP towards zero-carbon city (net zero carbon emissions by 2050).

Literatures

- 1) Yui K., Kuramochi H., Osako M. (2021) Measurement and modeling of heavy metal behaviors during the incineration of RDF in a pilot-scale kiln incinerator-Part 1: Modeling using multizonal thermodynamic equilibrium calculation. *Process Safety and Environmental Protection* 150; 373-384.
- 2) Kobayashi K., Yokoo Y., Kuramochi H., Tasaki T., Inaba R., Kawai K. (2021) Potential Effectiveness of On-site Anaerobic Co-digestion of Oily Sludge and Kitchen Waste at Large Commercial Facilities in Japan for Reducing CO₂ Emissions and Waste Recycling (in Japanese). *Journal of Water and Waste* 63(4); 470-77.
- 3) Nishimuta et al. (2021) Use of comprehensive target analysis with automated identification and quantification system (CTA-AIQS) for determination of contaminants of emerging concern in a sediment core from Beppu Bay, Japan. *Environmental Pollution* 272; 115587.
- 4) Kobayashi T., Kuramochi H., Xu K.-Q., Aizawa T., (2020) Bioleaching and removal of radiocesium in anaerobic digestion of biomass crops: Effect of crop type on partitioning of cesium. *Biotechnology Reports* 28; e00561.
- 5) Noda et al. (2020) Behavior of radioactive cesium during direct melting treatment of decontamination waste with and without Cl-containing additives. *Process Safety and Environmental Protection* 143; 186-195.
- 6) Kobayashi T., Kuramochi H., Xu K.-Q., Maeda K. (2020) Simple solvatochromic spectroscopic quantification of long-chain fatty acids for biological toxicity assay in biogas plants. *Environmental Science and Pollution Research* 27(15); 17596-17606.
- 7) Kuramochi H., Zhang Z., Yui K., Kobayashi T., Maeda K. (2020) Transesterification of triolein and methanol with Novozym 435 using co-solvents. *Fuel* 263; 116600.
- 8) Kuramochi H., Maeda K., Kobayashi T. (2020) Aggregation of immobilized enzyme during transesterification of triolein and methanol, and the effect of two types of aggregates on reaction yield. *Fuel* 260; 116343.

- 9) Matsukami H., Takemori H., Takasuga T., Kuramochi H., Kajiwara N. (2020) Liquid chromatography-electrospray ionization-tandem mass spectrometry for the determination of short-chain chlorinated paraffins in mixed plastic wastes. *Chemosphere* 244; 125531.
- 10) Shi C., Hu Y., Kobayashi T., Zhang N., Kuramochi H., Zhang Z., Xu K-Q. (2019) Anaerobic degradation of deca-brominated diphenyl ether contaminated in products: Effect of temperature on degradation characteristics. *Bioresource Technology* 283; 28-35.
- 11) Shi et al. (2019) Distribution characteristics of poly-brominated diphenyl ethers between water and dissolved organic carbon from anaerobic digestate: Effects of digestion conditions. *Chemosphere* 223; 358-365.
- 12) Kuribara et al. (2019) Time series of hexabromocyclododecane transfers from flame-retarded curtains to attached dust. *Science of the Total Environment* 696; 133957.
- 13) Zhang Z., Kuramochi H., Osako M. (2019) Predicted distribution of 16 short-chain chlorinated paraffins in air, water, soils and sediments. *Environmental Chemistry Letters* 17(1); 515-520.
- 14) Yui K., Kuramochi H., Osako M. (2018) Understanding the Behavior of Radioactive Cesium during the Incineration of Contaminated Municipal Solid Waste and Sewage Sludge by Thermodynamic Equilibrium Calculation. *ACS Omega* 3(11); 15086-15099.
- 15) Fujiwara et al. (2018) Influence of the type of furnace on behavior of radioactive cesium in municipal solid waste thermal treatment. *Waste Management* 81; 41-52.

Other Activities

Japan Society of Material Cycles and Waste Management, Japan Society for Environmental Chemistry, American Chemical Society, The Society for Remediation of Radioactive Contamination in the Environment

Future Plan

We are tackling with recent important environmental issues such as marine plastic litter and climate change through our research on waste treatment and material cycles towards reducing the environmental risk. We will see a lot of countermeasures. However, we have to carefully evaluate their effect, cost, and trade-off relationships, and find out sustainable and more effective ones.

Messages to Students

Our institute is close to the Ministry of the Environment. Join us, and have a good opportunity to know the current environmental administration. Enjoy your research considering how it will contribute to the national environmental policy!