Yixi Tian

Ph.D., Columbia University in the city of New York
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Education Experience

Columbia University, School of Engineering and Applied Science, New York, NY Sep.2018 – Jan.2022

- Ph.D., Earth & Environmental Engineering, cumulative GPA: 3.9/4.0
- Honor: Columbia University, Earth Engineering Center Fellowships, 2018-2021; Earth and Environmental Engineering department teaching assistant scholarship 2019-2021; the fellow of Herbert H. Kellogg Fellowship Fund, 2021
- Concentration: Sustainable Waste Management, Mineral and Metallurgical Engineering
- Ph.D. Thesis: Characterization, Stabilization, and Utilization of Waste-to-Energy Residues in Civil Engineering Applications
- Advisor: Athanasios Bourtsalas, Nickolas J. Themelis, Shiho Kawashima
- Core Courses: Energy Sources and Conversion, Energy Harvesting, Numerical Methods in Geotechnics, CO_2 Utilization and Conversion, Photovoltaic Systems Engineering, Industrial Ecology-Earth Resource, Engineering Separations.
- Projects: Life Cycle assessment for Apple Production in Organic farming and Integrated Farming, Life Cycle of Lightweight Aggregate, Performance and Scenarios Assessment of Self-heated Pavement for Enhancing Sustainability, Methanol Production Plant from CO_2 Hydrogenation by Using Solar Power (Shell Renewable Energy Competition-Best Project Award)

Columbia University, School of Engineering and Applied Science, New York, NY Sep.2016 – May 2018

- Master of Science, Earth & Environmental Engineering, May 2018, GPA: 3.77/4.0
- Honor: Floyd Hasselriis Educational Award-ASME (The American Society of Mechanical Engineers)
- Concentration: Sustainable of Waste Management, Environmental Materials
- M.S. Thesis: Production of Structural Concrete from Waste-to-Energy Bottom Ash, May 2018
- Core Courses: Thermal Treatment-Waste/Biomass, Environmental Biochemical Processing, Particle Technology, Air Pollution Prevention/Control, Industrial Catalysis, GIS-Resource Environmental Infrastructure, Aquatic Chemistry, Surface and Colloid Chemistry
- Projects: ArcGIS-Potential Impact of Vesuvius on Population in Campania (Italy); Evil Twin Brewery Water Resource Recovery Facility-A Comparison of Two Systems; Transforming South Oak Creek CPP into a Waste-to-Energy Facility

Hefei University of Technology, School of Resource and Environmental Engineering, Hefei, China Sep. 2012-Jun 2016

- Bachelor of Engineering in Environmental Engineering, Jun.2016, GPA: 88.14/100
- Honors: Third-class Scholarship for Academic Performance (2015), Single Scholarship for Social Activity (2014), University Excellent Graduation Thesis (2016)
- Concentration: Environmental Engineering, Environmental Materials
- B.E. Thesis: Technical Study of Palygorskite Clayey Dolomite for Removal Lead Ions from Aqueous Solution (2016)
- Core Courses: Solid Waste Treatment and Disposal Engineering, Reinforced Concrete, Construction Technology, Control Engineering of Water Pollution, Industrial Wastewater Treatment Technology, Environmental Materials, Principles of Environmental Engineering, Microbiology, Ecological Rehabilitation Engineering, Pollution and Prevention of Ground Water, Control Engineering of Gas Pollution, Physical Pollution and Control Engineering, Pumping Station and Pipeline Engineering, Environmental Law, Environmental Economics, Economic and Cost Management, Fluid Mechanics, Mechanics of Materials, Theoretical Mechanics, Physical Chemistry, Analytical Chemistry, Organic Chemistry, Inorganic Chemistry.
- Projects: Sewage Treatment Plant with the Obel Oxidation Ditch; Design an Acid Mist Control System for a Metal Product Factory.

Research and Teaching Experience

Postdoctoral Research Scientist, Earth Engineering Center, Columbia University, New York, NY Feb.2022 – Present

- Exploring the broad framework of the circular economy and sustainable management of industrial residues, including WTE bottom ash/fly ash, coal bottom ash/fly ash, blast furnace slag, mining tailings, etc.
- Developing the studies in civil engineering applications (artificial aggregate, supplementary cementitious materials, and pavement), hydrometallurgy for metals recovery, and carbon capture, utilization, and sequestration (CCUS) technology.
- Coordinating the research on process engineering, and life cycle/supply chain economic, environmental, social and governance assessment.
- Guest lecture: Case Study: Characterization of Industrial Residues for Separation Science and Technology class.

Teaching Assistant, Columbia University, New York, NY Sep. 2018 – Dec.2018, Jan.2019 – Dec. 2021

- The courses in the Department of Earth and Environmental Engineering: Thermal Treatment-Waste/Biomass, Solid and Hazardous Waste Management, Industrial Ecology-Earth Resource, Teaching Lab Fall and Spring
- Activities: Assist the instructor with daily course work. Organize the students with activities and presentations. Help students with projects. Provide homework session, midterm and final exam reviews. Grade homework, final reports, and exams. Design the teaching lab experiments, provide guest lecture for the lab course, and organize students for the daily lab.

Research Associate, Earth Engineering Center, Columbia University, New York, NY Jun.2017 – Present

- Research: Transforming industrial residues into high value civil engineering products. Focus on Waste-to-Energy (WTE) residues: combustion bottom ash and air pollution control fly ash. Explore the sustainable utilization and assess the viability of using WTE residues in civil engineering applications. Identify the beneficial uses, the mechanisms of physical and chemical transformation. Determine the optimum solution and valuable application for WTE residues. Set up the experimental system in lab.
- Conference and Symposium:
  Performance of Structural Concrete Using Waste-to-Energy (WTE) combined ash, Use of Bottom Ash as a Concrete SCM session, American Concrete Institute (ACI) Convention, oral presentation, Mar. 2022.
  Energy Harvesting from Infrastructure and Ocean Systems (EHIOS), Engineering Conferences International (ECI), oral and poster presentation, Nov. 2019.
  Production of Structural Concrete from Waste to Energy Bottom Ash, oral presentation, Oct. 2017.
  The Performance and Utilization from Waste to Energy Residues, poster presentation, Oct. 2018.
  The Beneficial Utilization of Waste-to-Energy residues, oral presentation, Oct. 2019.

Consultant, Global WTERT Council Inc., New York, NY Sep. 2018 – Present

- Council to Global WTERT council: http://gwcouncil.org/. Explore the Waste-to-Energy residues utilization. Analyzing the characteristics and source difference of Waste-to-Energy residues.

Independent Researcher, Laboratory for Nano-mineralogy and Environmental Material, Hefei University of Technology
Hefei, China, Jun.2014 – Jul.2016

- Program: National College Students Innovation and Entrepreneurship Training Program, Team Leader
- Research: Investigating the performance and mechanisms for the removal heavy metal ions from aqueous solution by clayey dolomite in palygorskite clay deposit. Devoted over 1000 hours in experimental work. Wrote proposals, accomplished academic reports, passed oral defense and succeed in obtaining project approval, and finished two publications and two patents.
- Advisor: Tianhu Chen

- Result: A higher solid-aqueous rate and higher pH value can improve the removal efficiency. The main mechanism of removal is that lead ions are induced to deposit by clayey dolomite, and meanwhile produce hydrocerussite after dolomite dissolution.

Industrial Experience, Hefei University of Technology, Hefei, China Jun. 2015

- Anhui Conch Cement Company dry cement clinker production line to survey its pollution distribution
- Flue gas desulfurization system of Masteel No.2 ironmaking plant, Maanshan energy plant sewage treatment station and Magang Coking Co., Ltd

Publications & Patents

- Yixi Tian, A. C.(Thanos) Bourtsalas, Shiho Kawashima, Xiaoxuan Teng, and Nickolas J. Themelis. 2022. "Performance of Waste-to-Energy Fine Combined Ash/Filter Cake Ash-Metakaolin Based Artificial Aggregate." Construction and Building Materials 327: 127011. https://doi.org/10.1016/j.conbuildmat.2022.127011
- Yixi Tian, A. C.(Thanos) Bourtsalas, Shiho Kawashima, Siwei Ma, and Nickolas J. Themelis. 2020. "Performance of Structural Concrete Using Waste-to-Energy (WTE) Combined Ash." Waste Management 118: 180–89. https://doi.org/10.1016/j.wasman.2020.08.016.
- Yixi Tian, Hongwei Li, Jingjing Xie, Gao Qiu, and Tianhu Chen. The Function and Mechanism of the Removal of the Lead Ions from Aqueous Solutions by Clayey Dolomite, Acta Petrologica et Mineralogica, Vol.36, No. 1: 104-109, Jan., 2017.
- Gao Qiu, Qiaoqin Xie, Tianhu Chen, Haibo Liu, Jingjing Xie, Hongwei Li, and Yixi Tian. Performance and Mechanisms for the Removal of Copper ions from Aqueous Solutions by Clayey Dolomite, Geological Journal of China Universities, December 2015, Vol 21, No,4, pp.616-622.
- Patent for Invention: Qiaoqin Xie, Tianhu Chen, Gao Qiu, Jingjing Xie, Yuke Zhu, Hongwei Li, and Yixi Tian. Method for treating heavy metal wastewater. State Intellectual Property Office, China. Application No.: CN:201510582084:A, Publication No.: CN105110445A.
- Patent for Invention: Hongwei Li, Yixi Tian, Tianhu Chen, Jingjing Xie, Hanlin Wang, and Peng Cheng. Heavy metal wastewater treatment material and method thereof. State Intellectual Property Office, China. Application No.: CN:201610224584:A, Publication No.: CN105858832A.

Technical Skills

- PANalytical XPert3 Powder X-ray Diffraction (XRD), qualitative and quantitative analysis, Columbia Nano Initiative
- TA Instruments Q50 Thermogravimetric Analyzer and TAM Air Isothermal Calorimeter analysis
- Inductively coupled plasma-optical emission spectrometry (ICP-OES)
- Atomic Absorption Spectroscopy (AAS)
- Thermo Scientific Dionex ion chromatography (IC) system
- X-ray Fluorescence (XRF) spectrometry
- PHI 5500 X-ray photoelectron spectroscopy (XPS)
- UV-Vis Spectrophotometer
- Zeiss Scanning electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDS).
- Transmission electron microscopy (TEM)
- Keyence VHX-5000 Digital Microscopy
- Micromeritics ASAP 2020 HV BET analyzer
- Instron 600DX 135k Universal Testing Machine, Robert A.W. Carleton Strength of Materials Laboratory
- OriginLab, OpenLCA, SimaPro, ArcGIS, AutoCAD, Biowin
- Python, R Language, C/C++ Language
- French Horn, Grading Test Level 7 Certificate, China Conservatory of Music