Cross Research Lab @ Tokyo Tech
School of Environment and Society
Transdisciplinary Science and Engineering / Energy Course/ Materials Science

Tokyo Tech Energy Course

TSE TOKYO TECH

Prof. Jeffrey S. Cross

Prof. Cross is an U.S. citizen that has lived and worked both in Japan for over 25 years. In his lab, students are encouraged to direct their own novel thesis research and publish their results. The lab atmosphere supports global communication skills and is output driven. Japanese and international students have a great opportunity to learn American English communication skills and critical thinking. This poster summarizes the lab research topics and educational activities. Please see the lab website if you are interested in joining, visiting the lab and learning more.

Teaching/Seminar

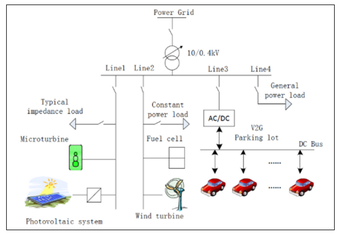
Prof. Cross teaches graduate courses on Academic Writing and Energy & Environment. He also teaches various undergraduate courses on online course creation, video-making, Engineering Measurements, and Materials and Molecular Engineering. He also holds his own lab seminar where he provides research guidance to students in the lab.

Online Education

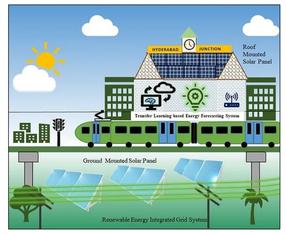
Prof. Cross founded and manages the Online Content Research and Development (OCRD) section and has produced a number of edX Massive Online Open Courses (MOOCs). Prof. Cross works closely with teaching assistants and staff to develop educational technology and improve MOOC quality using learning analytics. He won the best paper award at the 2019 IEEE conference on Learning with MOOCs.

Energy Policy Group

Energy Policy



Vehicle to Grid Simulation in Xi'an China

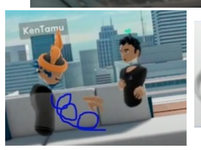


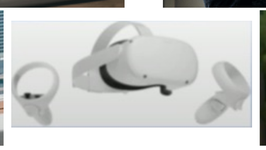
Railway Station Solar Power Forecasting

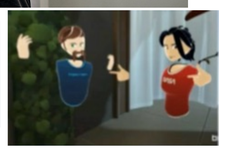
Climate change is the greatest challenge of our time. Energy issues are complex and require knowledge from various fields. The "Energy Policy" group conducts research to develop models to provide energy solutions to the challenges faced by society (SDG 7 Energy). Current research topics are Vehicle to Grid (V2G) Integration on microgrid in Xi'an China (left figure), Solar power output forecast system for Hyderabad Railway Station in India (right figure), and energy storage system for outer space (moon). Energy policy group research is conducted in collaboration with the Wakeyama Lab.

Educational Technology Group

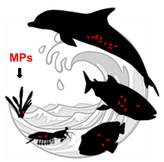
The Educational Technology group uses design-based approaches to introduce improvements to education using technology (SDG 4 quality education). Research topics include Virtual Reality (VR) assisted English language and mathematics learning, automated essay grading, computer vision in sign language learning, life-long learning, computational thinking skills, metacognition, personalized learning, and AI use in education of Japanese English language learners.

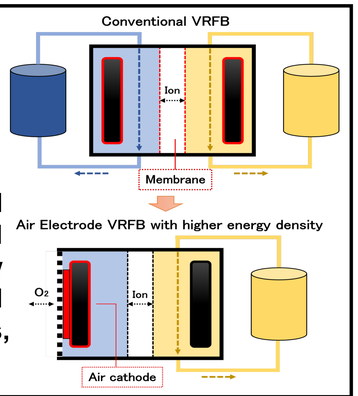






Assistant Prof. Cheng Shuo (Tei)





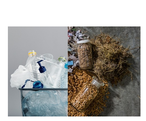
Asst. Prof. Tei's research focuses on the toxicological evaluation of microplastic, development of novel microbial fuel cells and technological improvements of vanadium redox flow batteries. Her research covers environmental science and engineering. She looks forward to working with students, visitors, and fellows overseas on various related research projects.

Dr. Sasipa Boonyubol

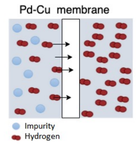
Dr. Sasipa is a lecturer in the Global Scientists and Engineers Program (GSEP). Her research focuses on biofuel processing, biomass conversion and upgrading, and education technology. She teaches undergraduate courses on Engineering Thermodynamics, Visionary Project, Biological Engineering, Engineering Measurement, and Industrial Chemistry.

Biofuels Group

The Biofuels group transforms various types of wastes as shown in the images at the right into valuable materials/chemicals by using knowledge of chemical engineering processes, catalysts, and machine learning. The group also conducts research on Pd-Cu membrane technology for green hydrogen gas separation and storage (image below). SDG 7 Clean energy



Waste stream gasification



Separation of green H_2

Green Hydrogen

Sewage Sludge

Lipids Extraction and Transesterification

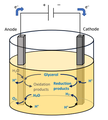
Biofuel

Lignin

Depolymerization Aided by AI/Machine learning

Chemicals

Waste glycerol



Electrocatalytic reduction

Alternative biofuel - biopropanol

Waste cooking oil

Sustainable aviation fuel

If you want to take part in this world-class research group and publish in high-impact journals, please contact Prof. Cross.

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