

Green Innovation Webinar Series No.3

1. Key Parameters of Wood Wastes Conversion for Value-Added Products

2. Sustainability at Solar-Water Nexus



Date & Time

23 February 2021 (Tuesday) 18:30-20:00, registration starts at 18:15, by webinar

Programme Highlights

The Green Innovation Webinar Series aims to enhance the collaboration between HKIE and universities through exchanging new environmental technologies and novel research projects ideas via the interactive online platform. This is the third episode consisting of two talks to be delivered by the academic staff from Department of Civil and Environmental Engineering of The Hong Kong Polytechnic University.

1. Key Parameters of Wood Wastes Conversion for Value-Added Products

Wood is a valuable nature resource with its proper utilization shall mitigate the global warming. However, over-utilization of woody products and generation of yard wastes have made this resource an environmental problem in Hong Kong. Woody biomass of different species, parts, and conditions, in fact can offer many physiochemical properties for valorization. From construction materials, fuels, to chemicals, this presentation introduce the key characteristics of wood and some state-of-the-art techniques to convert woody biomass into valuable products. Briefly, wood-based composite materials are composed of conditioned woods and plastics which offers key properties for non-structural and indoor decoration. Defibrillation and pulping of wood chips creates high quality fibers and papers, although the perspective role has been gradually replaced by plastics and electronic instruments. The potential of lignocellulosic biorefinery is significant. Lignin, hemicelluloses, celluloses are important building-block chemicals in the plant cell walls of woods, which can serve as functional precursors of many valuable products after chemical, physical, and biological processes. With further recognitions of the values in woods, it is our hope that more research and applications can be practiced to complete the circular economy of this green materials utilized throughout the human history and the future.

2. Sustainability at Solar-Water Nexus

Among the big three renewables of hydropower, solar energy, and wind power, solar energy has the highest natural abundance and the lowest geographical limitation. In this presentation, two solar energy-based technologies will be presented as our recent efforts to supplement fresh water from unconventional sources and to enhance solar-energy conversion by water-based approaches. (1) The photovoltaic-membrane distillation (PV-MD) utilizes the waste heat of PV-panel to drive water distillation within multistage MD design. The state-of-the-art PV-MD is able to produce freshwater at a record-breaking rate and cools PV panels at the same time. The PV-MD is poised to simultaneously generate electricity and fresh water where conventional approaches are not effective. (2) There is plenty of water vapor constantly preserved in the earth's atmosphere. Sorption based atmospheric water harvesting (AWH) is emerging as an attractive and clean way of producing fresh water. AWH has very recently be extended to help cool PV panel and a 19% electricity increase was demonstrated at field tests.

Speakers

Dr Ben Leu

Associate Professor, Department of Civil and Environmental Engineering, PolyU

Dr Shao-Yuan (Ben) Leu obtained his BSc/MSc degrees from the School of Forestry at the National Taiwan University (1993-97) and received his MPhil/PhD from the Civil and Environmental Engineering Department of UCLA (2003-09) on biological systems. He was a lecturer at UC Riverside (2010-11) and postdoctoral fellow at USDA Forest Products Laboratory in Madison, Wisconsin (2011-13). At PolyU, Dr Leu established the Green Energy Process Laboratory which aims to characterize and fractionate the physiochemical structure of plant cell wall, hence forging thermo-/bio-conversion theories of woody materials into practices. For more details of Dr Leu's team, please refer to <https://www.polyu.edu.hk/cee/~syleu/>.

Dr Wang Peng

Associate Professor, Department of Civil and Environmental Engineering, PolyU

Dr Peng Wang obtained his PhD from University of California, Santa Barbara (UCSB) in 2008. He joined King Abdullah University of Science and Technology (KAUST) in 2009 as a founding faculty member. He was the program chair of Environmental Science and Engineering at KAUST from 2013 to 2017. He joined The Hong Kong Polytechnic University in August 2019. Dr Wang's research interests are in environmental nanotechnology and renewable energy-driven clean water production. He received the prestigious 'The Prince Sultan bin Abdulaziz International Prize for Water' (*PSIPW*) in 2020 and the Nanova Frontier Research Award from the Chinese-American Professors in Environmental Engineering and Science (CAPEES) in 2020. Dr Wang serves as an associate editor of *Environmental Science & Technology*, an academic journal published by American Chemical Society (ACS) since 1967

Language

English

Registration & Enquiries

The seminar is free of charge. For registration, please complete the online enrollment form in Environmental Division website (<http://ev.hkie.org.hk/>). Successful applicants will be notified before the event. For enquiries, please contact Mr Benjamin Lam at bencamay1119@gmail.com or Mr Fredrick Leong at fredleong@yahoo.com. Attendance certificate will be awarded after the webinar.