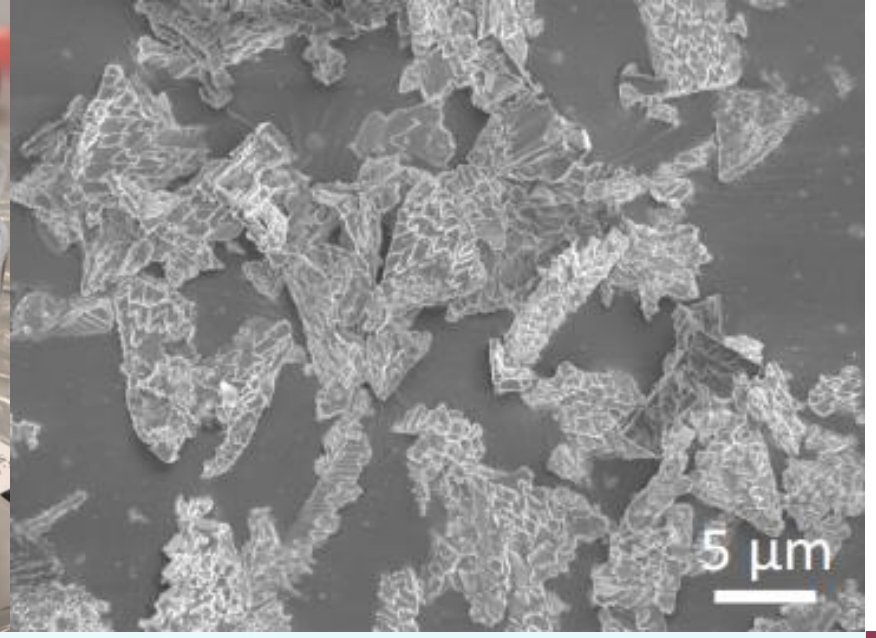
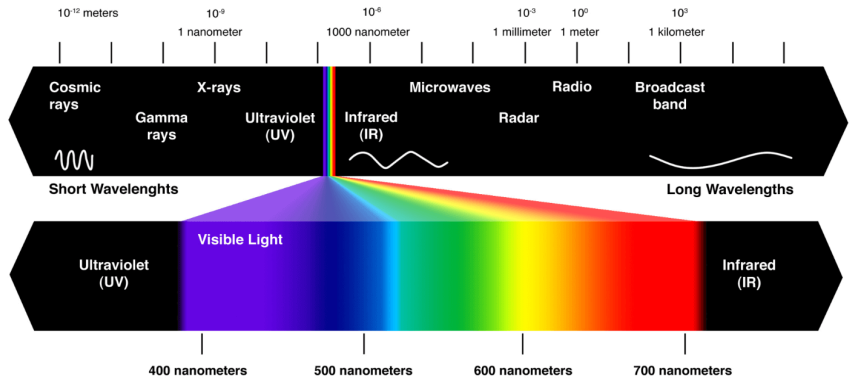




Environmental and Energy Materials Laboratory

Room ZN 1102, Block Z,

Department of Civil and Environmental Engineering,

The Hong Kong Polytechnic University

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
土木及環境工程學系

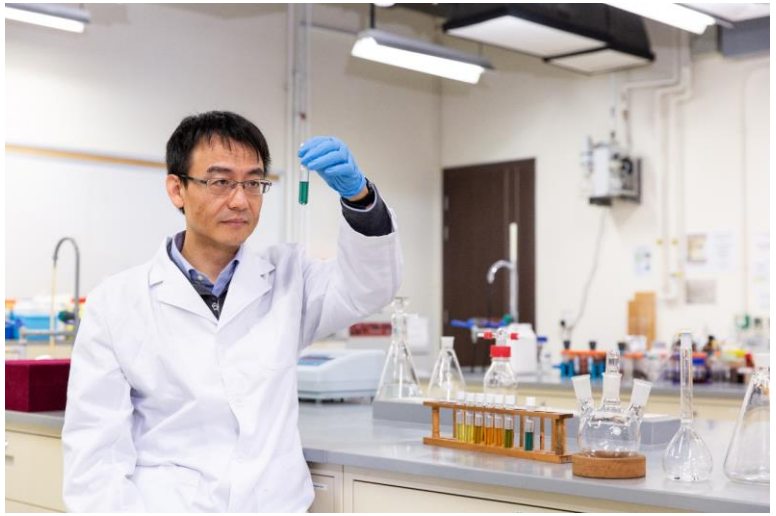
Opening Minds • Shaping the Future
啟迪思維 • 成就未來

Introduction

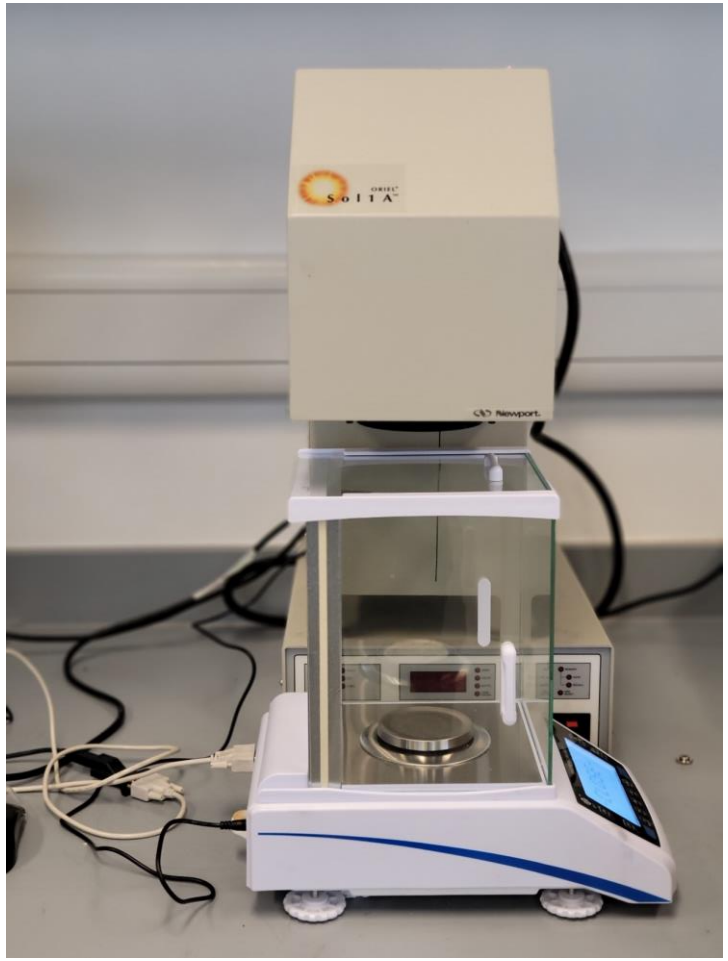
Environmental and Energy Materials Laboratory is newly established and led by Dr. WANG, P., who is a leading researcher in the field of advanced materials and designs for sustainable water-energy nexus.

The laboratory houses a variety of equipment, including:

- Oriel Sol1A Class ABB Solar Simulators
- Binder Vacuum Oven
- Drying Oven
- Thermo Scientific Thermolyne Muffle Furnace
- Electrical Spinning Instrument
- Sourcemeter
- Compact and Modular Potentiostat
- Rotation Disc Electrode
- pH Meter
- Centrifuge
- Freezer and Refrigerator
- Fume Cabinets
- Ultrasonic Bath and Oil Bath
- Rotary Evaporator
- Magnetic Hot Plate Stirrers
- Vacuum Filtration Apparatus
- Electronic Balances
- IR Camera



Main Equipment



Solar Simulators

ORIEL® Sol1A™ Class ABB Solar Simulator is a cost-effective and rugged system that takes solar simulation to next level. It uses a xenon lamp and proprietary filter that efficiently and reliably meets Class ABB performance parameters without compromising the 1 SUN output power. The solar simulator can be used in a wide range of research areas including photobiology, photooxidation, photodegradation, photovoltaics, and photocatalysis.

Academic Staff

Dr. WANG, P. (王鵬)

Associate Professor

Email: peng1.wang@polyu.edu.hk

Homepage: http://www.wang-lab.net/

Dr. LEU, S. Y., Ben (呂紹元)

Associate Professor

Email: shao-yuan.leu@polyu.edu.hk

Homepage: http://www.polyu.edu.hk/cee/~syleu

Research Spotlight

Designing a next generation solar crystallizer for real seawater brine treatment with zero liquid discharge

nature COMMUNICATIONS

ARTICLE

https://doi.org/10.1038/s41467-021-21124-4 OPEN

Designing a next generation solar crystallizer for real seawater brine treatment with zero liquid discharge

Chenlin Zhang[1], Yusuf Shi[1], Le Shi[1], Hongxia Li[2], Renyuan Li[1], Seunghyun Hong[1], Sifei Zhuo[1], Tiejun Zhang[2] & Peng Wang[1,3]✉

Proper disposal of industrial brine has been a critical environmental challenge. Zero liquid discharge (ZLD) brine treatment holds great promise to the brine disposal, but its application is limited by the intensive energy consumption of its crystallization process. Here we propose a new strategy that employs an advanced solar crystallizer coupled with a salt crystallization inhibitor to eliminate highly concentrated waste brine. The rationally designed solar crystallizer exhibited a high water evaporation rate of 2.42 kg m^{-2} h^{-1} under one sun illumination when treating real concentrated seawater reverse osmosis (SWRO) brine (21.6 wt%). The solar crystallizer array showed an even higher water evaporation rate of 48.0 kg m^{-2} per day in the outdoor field test, suggesting a great potential for practical application. The solar crystallizer design and the salt crystallization inhibition strategy proposed and confirmed in this work provide a low-cost and sustainable solution for industrial brine disposal with ZLD.

Simultaneous production of fresh water and electricity via multistage solar photovoltaic membrane distillation

nature COMMUNICATIONS

ARTICLE

https://doi.org/10.1038/s41467-019-10817-6 OPEN

Simultaneous production of fresh water and electricity via multistage solar photovoltaic membrane distillation

Wenbin Wang[1], Yusuf Shi[1], Chenlin Zhang[1], Seunghyun Hong[1], Le Shi[1], Jian Chang[1], Renyuan Li[1], Yong Jin[1,2], Chisiang Ong[1], Sifei Zhuo[1] & Peng Wang[1,2]

The energy shortage and clean water scarcity are two key challenges for global sustainable development. Near half of the total global water withdrawals is consumed by power generation plants while water desalination consumes lots of electricity. Here, we demonstrate a photovoltaics-membrane distillation (PV-MD) device that can stably produce clean water (>1.64 kg·m^{-2}·h^{-1}) from seawater while simultaneously having uncompromised electricity generation performance (>11%) under one Sun irradiation. Its high clean water production rate is realized by constructing multi stage membrane distillation (MSMD) device at the backside of the solar cell to recycle the latent heat of water vapor condensation in each distillation stage. This composite device can significantly reduce capital investment costs by sharing the same land and the same mounting system and thus represents a potential possibility to transform an electricity power plant from otherwise a water consumer to a fresh water producer.

Lab-in-charge and Technical Staff

Lab-in-Charge

Dr. WANG, P. (王鵬)

Associate Professor

Email: peng1.wang@polyu.edu.hk

Homepage: http://www.wang-lab.net/

Technical Staff

Mr. CHAN, Y. H., Jonathan

Email: yhjchan@polyu.edu.hk

Tel: (852) 2766-6077

Address
Room ZS 1102, Block Z, The Hong Kong Polytechnic University/
Room ZN 1102, Block Z, The Hong Kong Polytechnic University

Opening Hours
Monday 8:45am – 12:30pm, 1:30pm – 5:45pm
Tuesday to Friday 8:45am – 12:30pm, 1:30pm – 5:30pm
(excluding Saturday, Sunday & public holidays)