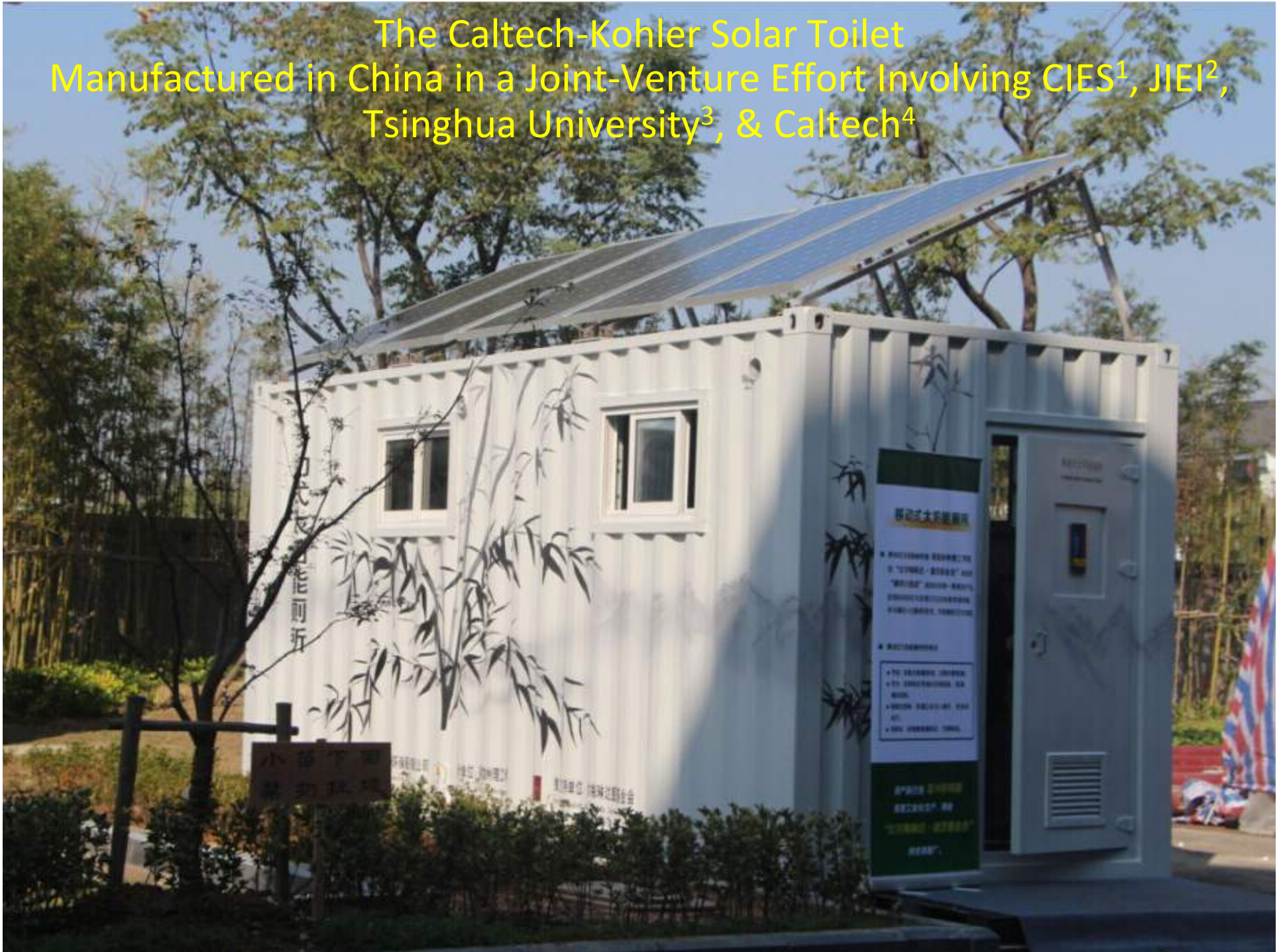


The Caltech-Kohler Solar Toilet
Manufactured in China in a Joint-Venture Effort Involving CIES¹, JIEI²,
Tsinghua University³, & Caltech⁴





¹CHINA INTERNATIONAL ENVIRONMENTAL SERVICES CO.,LTD (CIES)

²JIANGSU INSTITUTE FOR ENVIRONMENTAL INDUSTRY (JIEI)

³TSINGHUA UNIVERSITY, BEIJING (TU)

⁴CALIFORNIA INSTITUTE OF TECHNOLOGY (CALTECH)







移动式太阳能厕所

Portable Solar Powered Toilet

TOILET



出品单位：中国宜兴环保科技工业园
Dita Yiqing Industrial Park for Environmental Science & Technology



生产单位：江苏五洲环保服务有限公司
China International Environmental Services Co., LTD

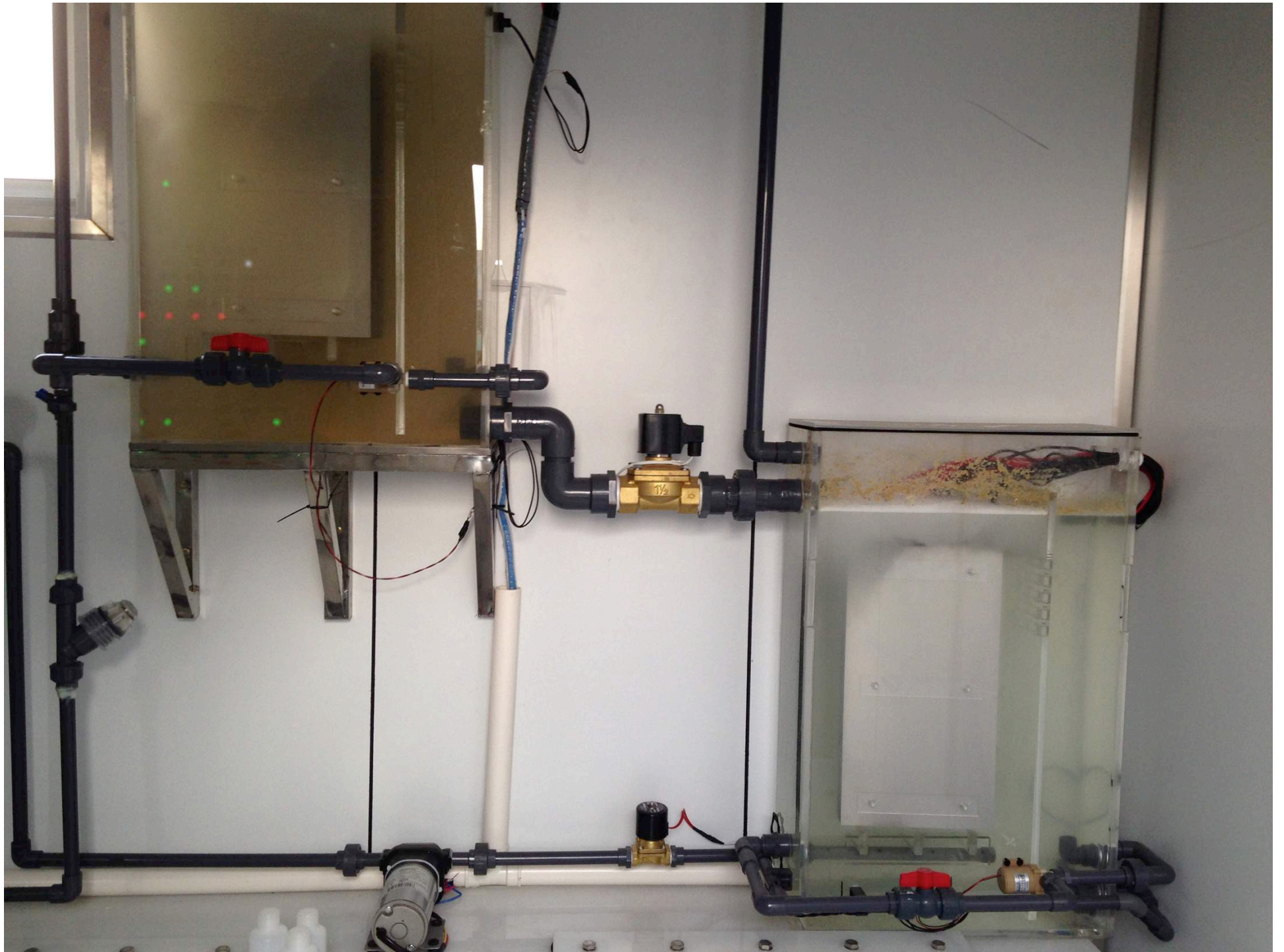


设计单位：美国加州理工学院
California Institute of Technology



推广支持单位：比尔梅琳盖茨基金会
Promotion Support: Bill & Melinda Gates Foundation









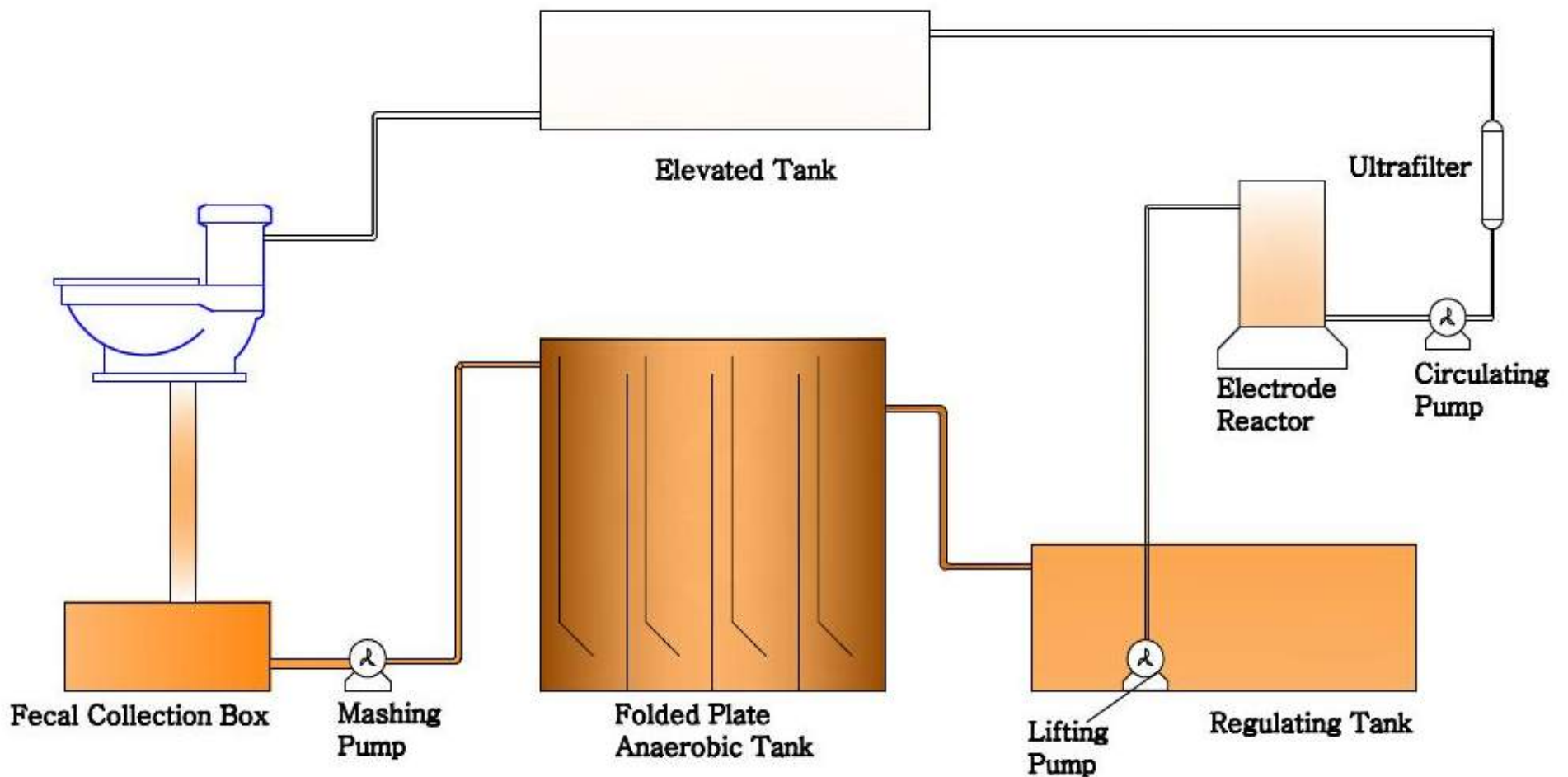






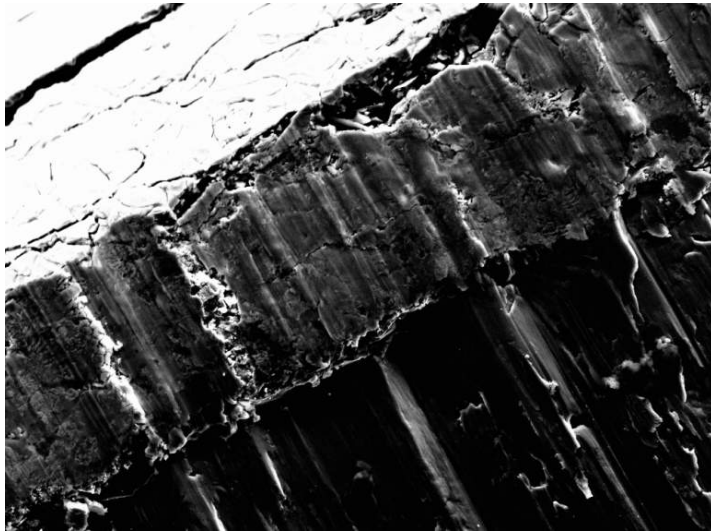


Treatment Side Flow Diagram

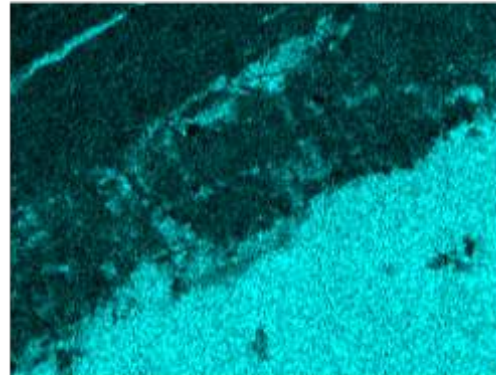




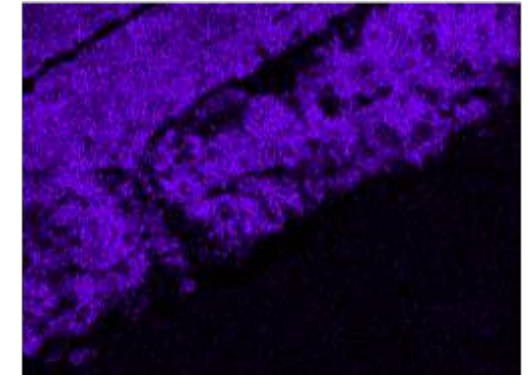
$\text{Ir}_{0.7}\text{Ta}_{0.3}\text{O}_y / \text{Bi}_{0.3}\text{Ti}_{0.7}\text{O}_x$ Bilayer Electrodes



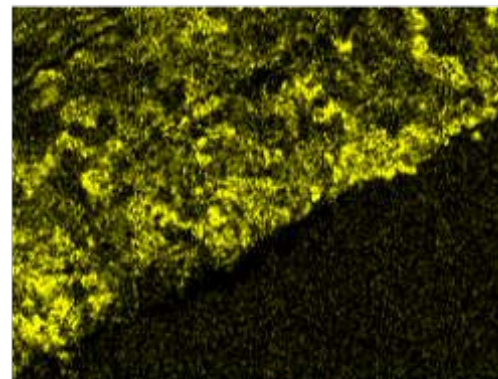
Ti K α 1



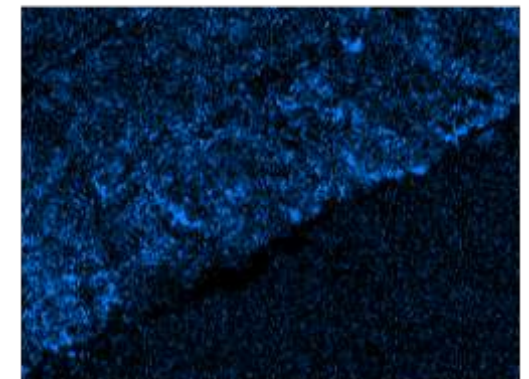
Bi M α 1



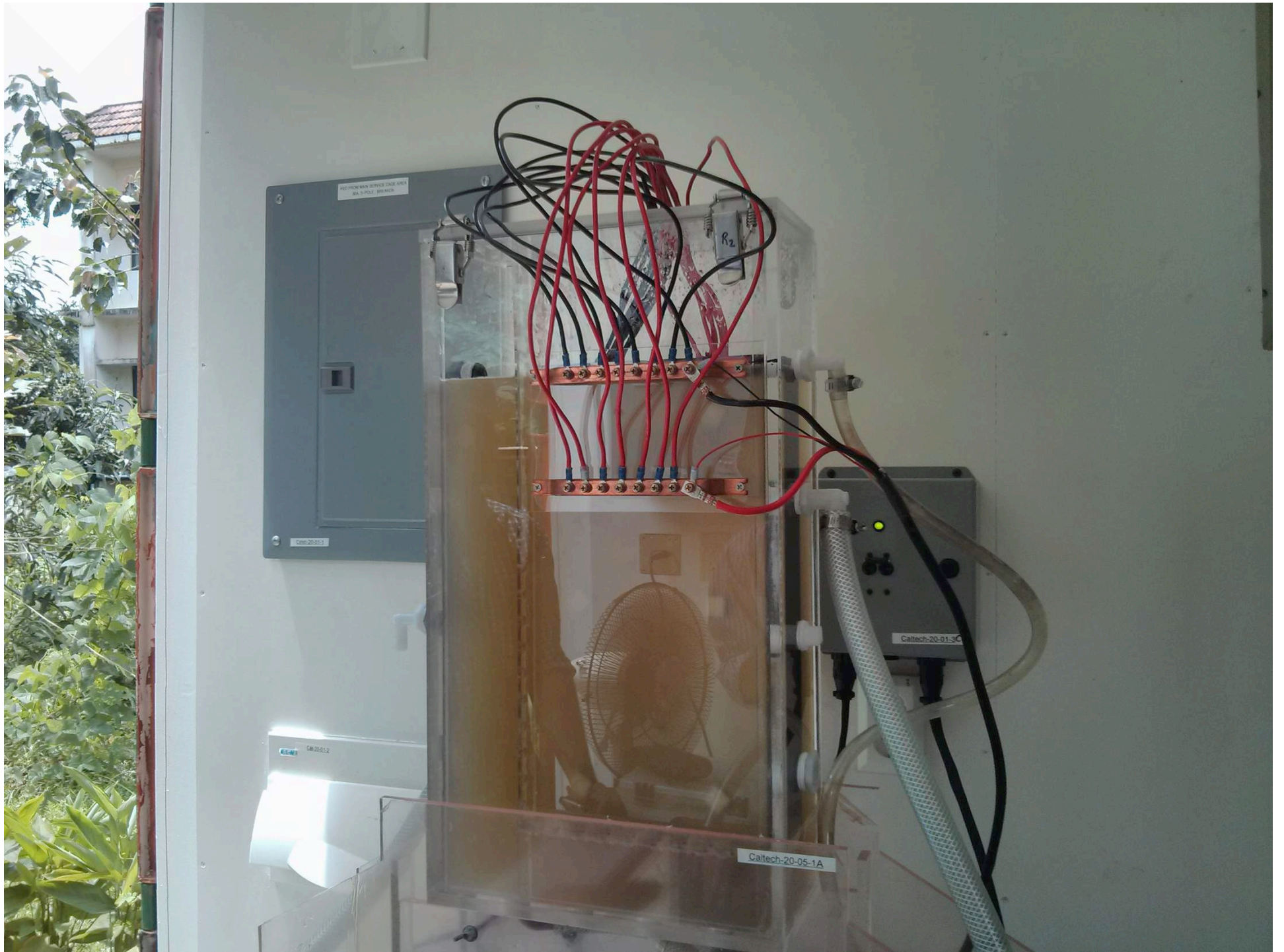
Ir M α 1



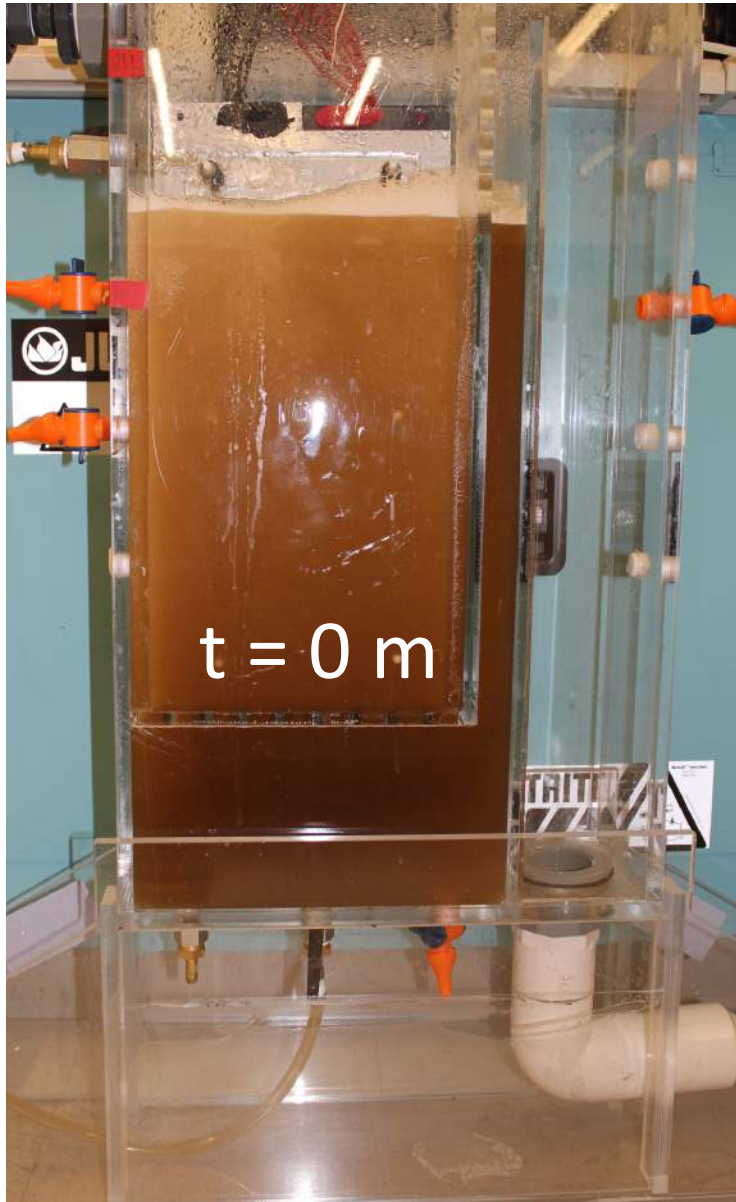
Ta M α 1



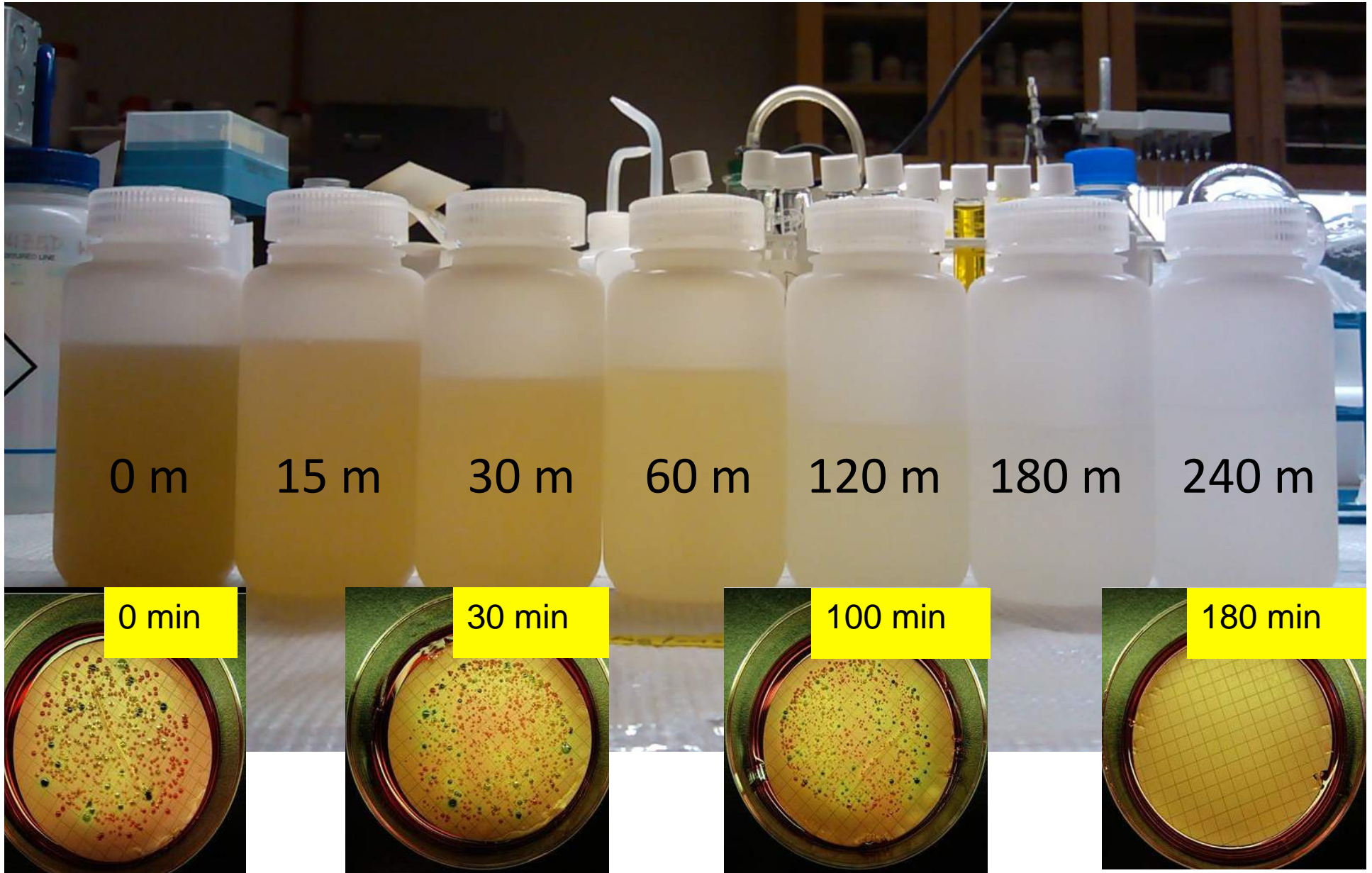
Thermal Diffusion of
Metal Ions through
Hetero-junctions



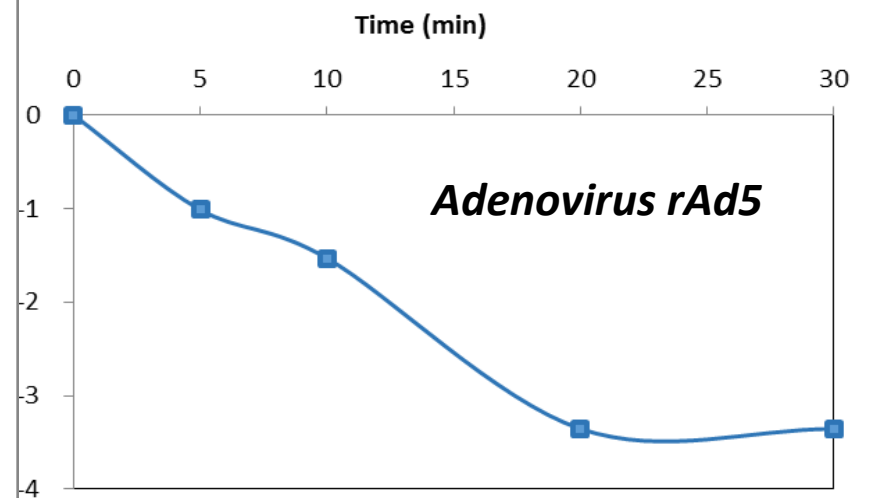
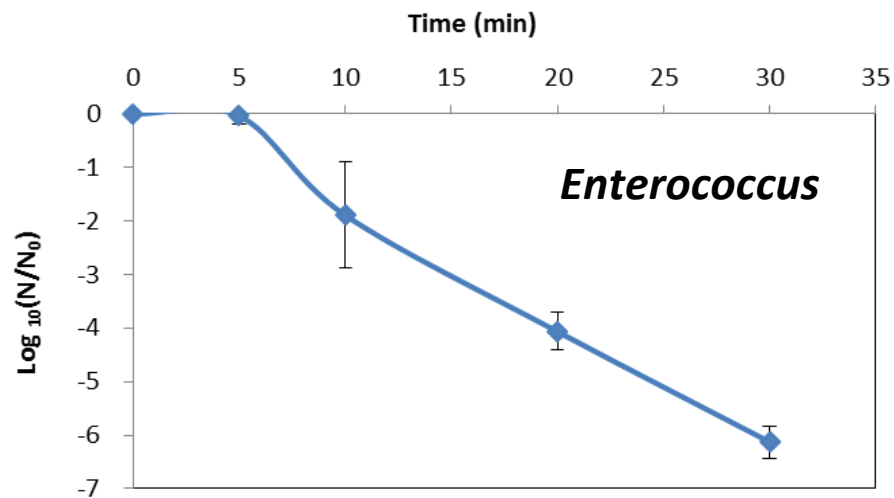
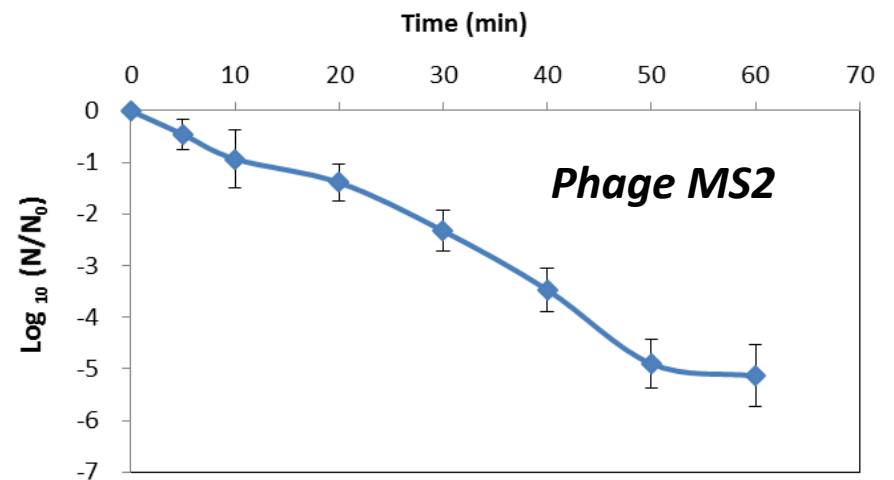
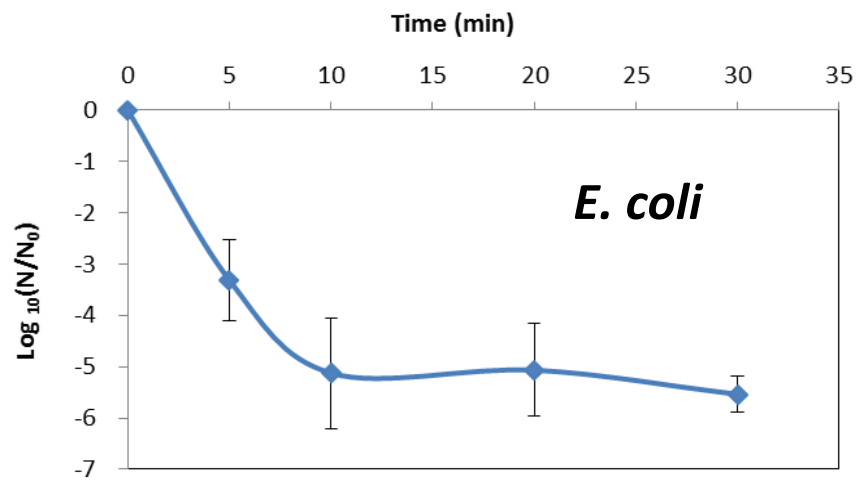
Electrochemical Wastewater Treatment



Color Changes & Total Coliform Disinfection vs. Time

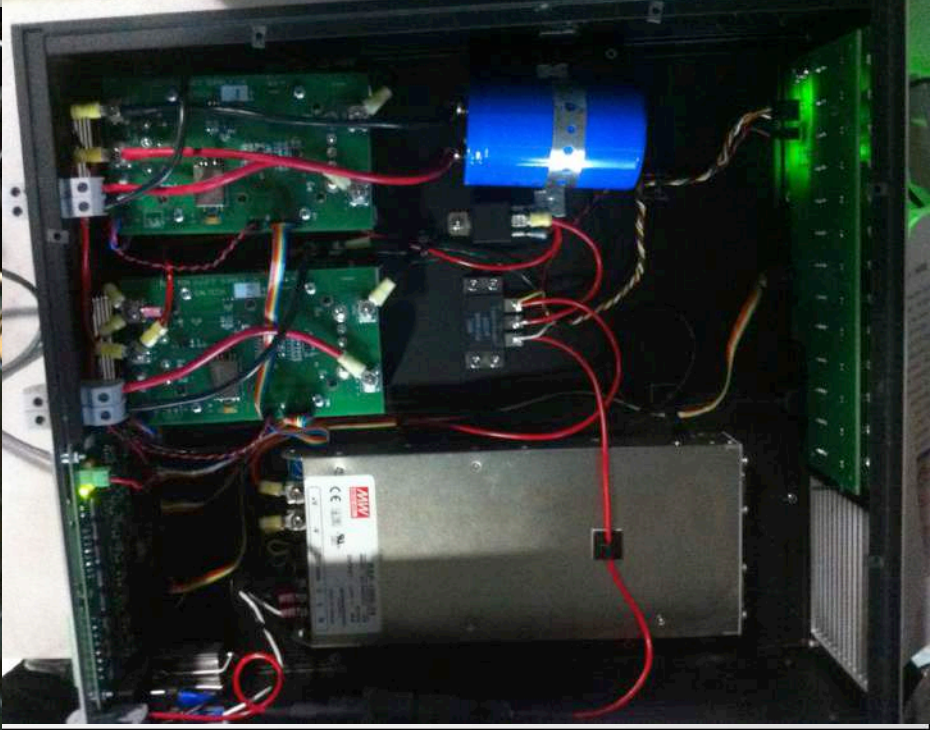
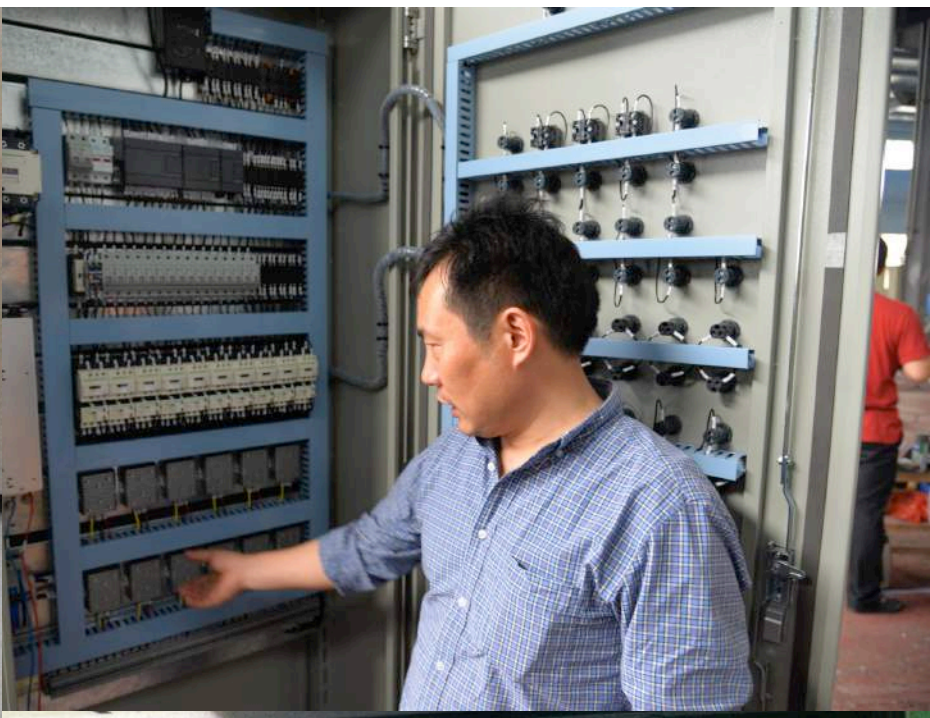


Disinfection vs. Time





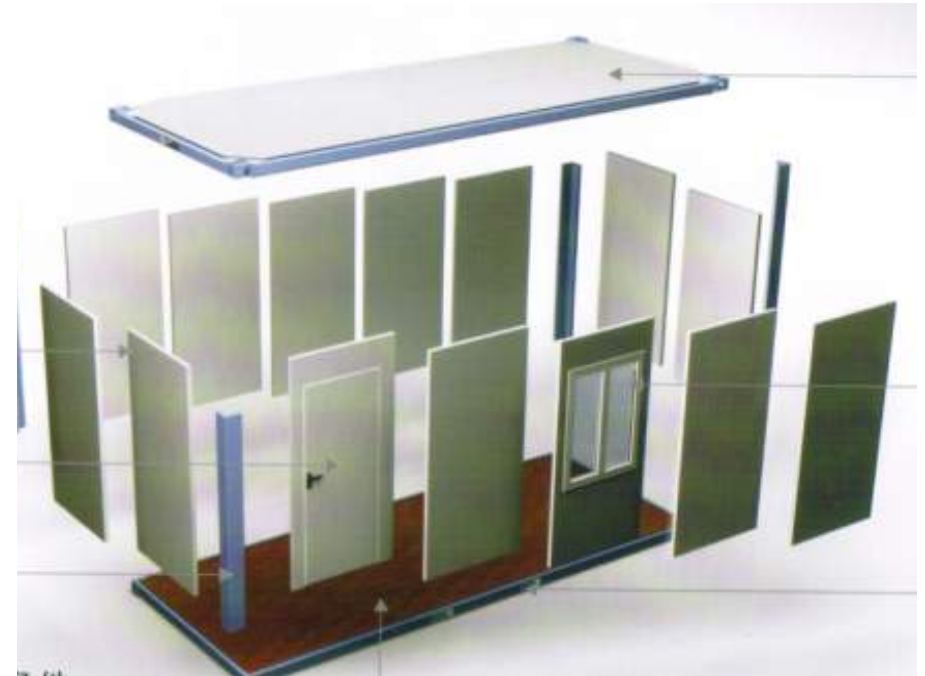
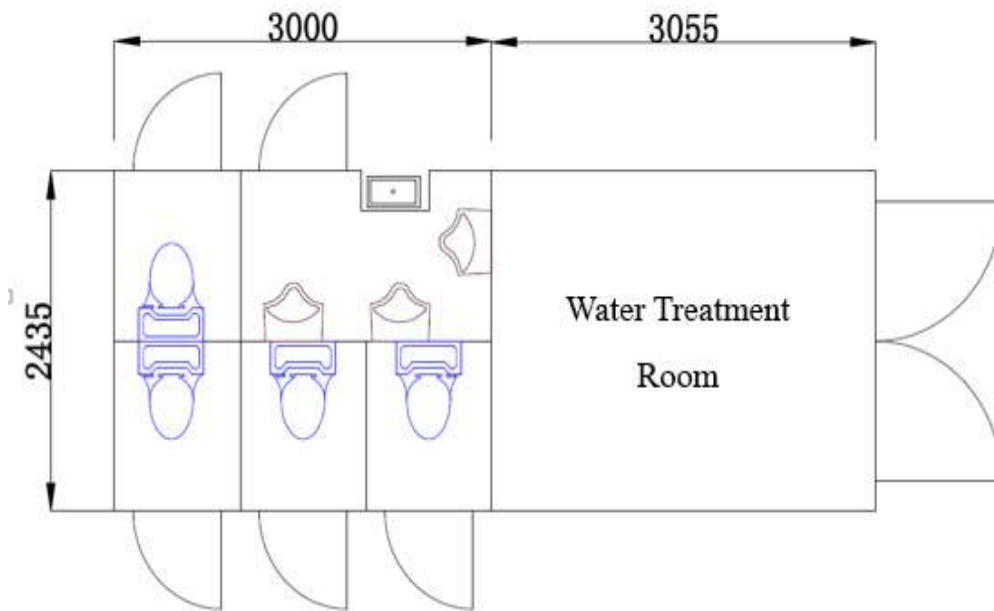
Kohler-Caltech Single Family Unit



Manufacturing Complex in Yixing, China



Modular Toilet Systems – First Installation on the Campus of Tsinghua University Beijing



Specifications	4 unisex water closets + 3 urinals	
Dimensions	Length	6055 mm
	Width	2435 mm
	Height	2840 mm
Equipment Weight	2000 kg	
Operating Power	550 W	

Field Assembly of Modular IKEA-Like Component Design Reduces Transportation Costs



1. Container
base on a
padded base



2. Install 4
support columns



3. Install toilet
container roof

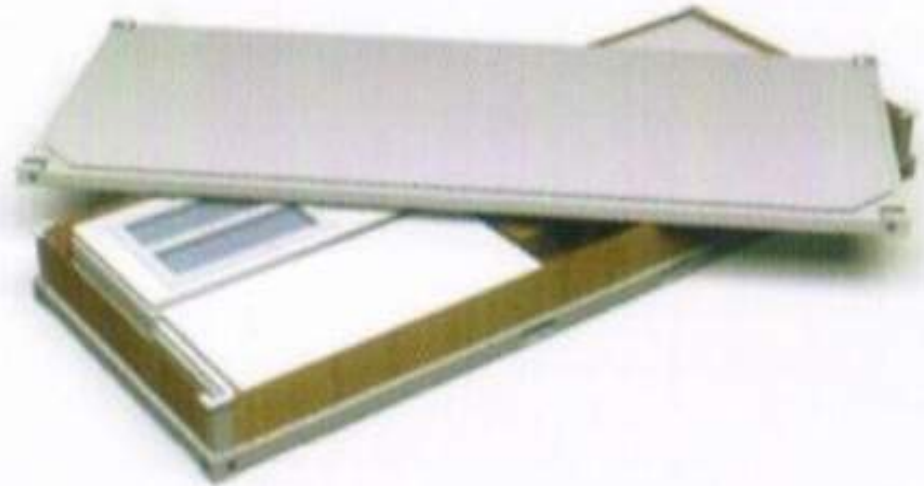
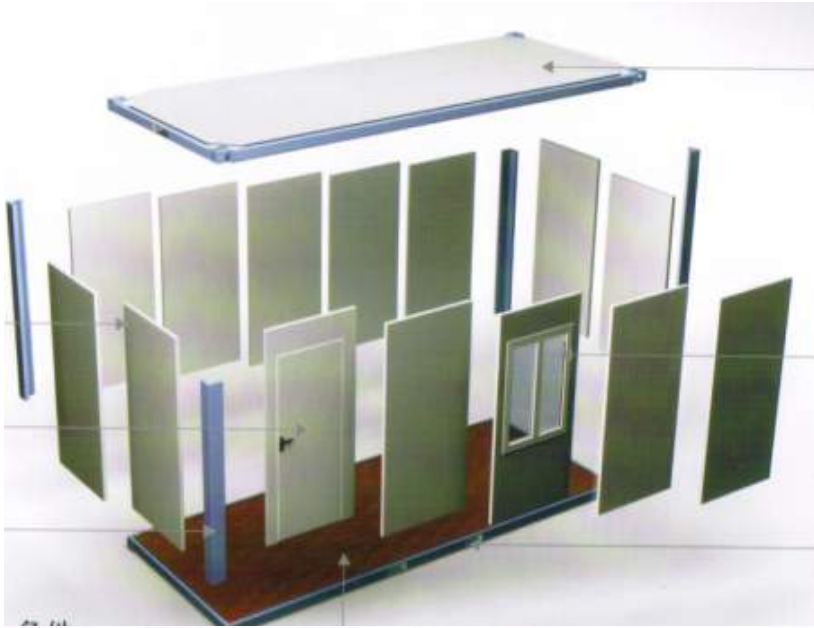


4. Install
wallboard in
sequence by
serial number



5. Wallboard
installation
completed

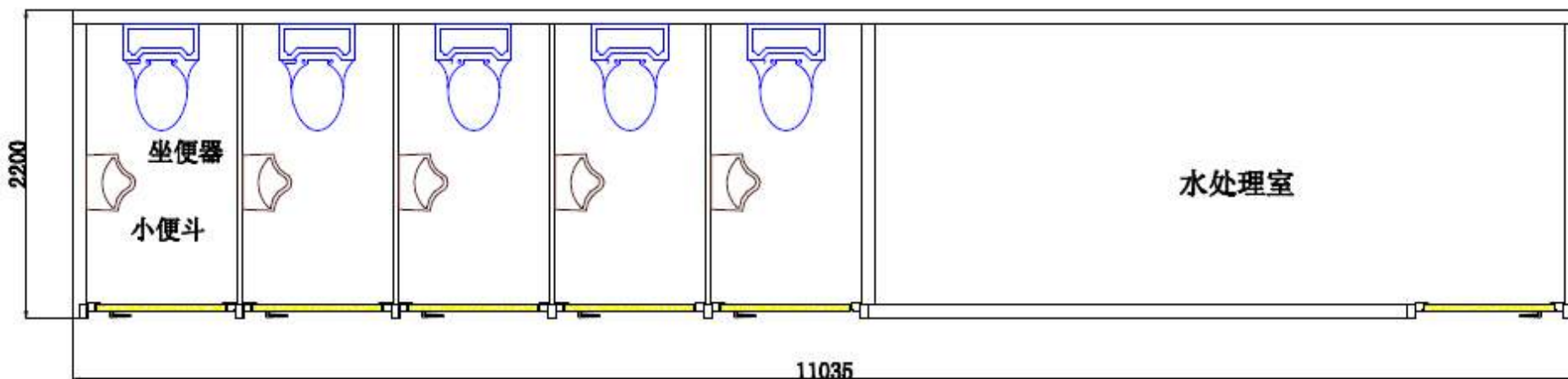
Breakdown, Packing & Shipping



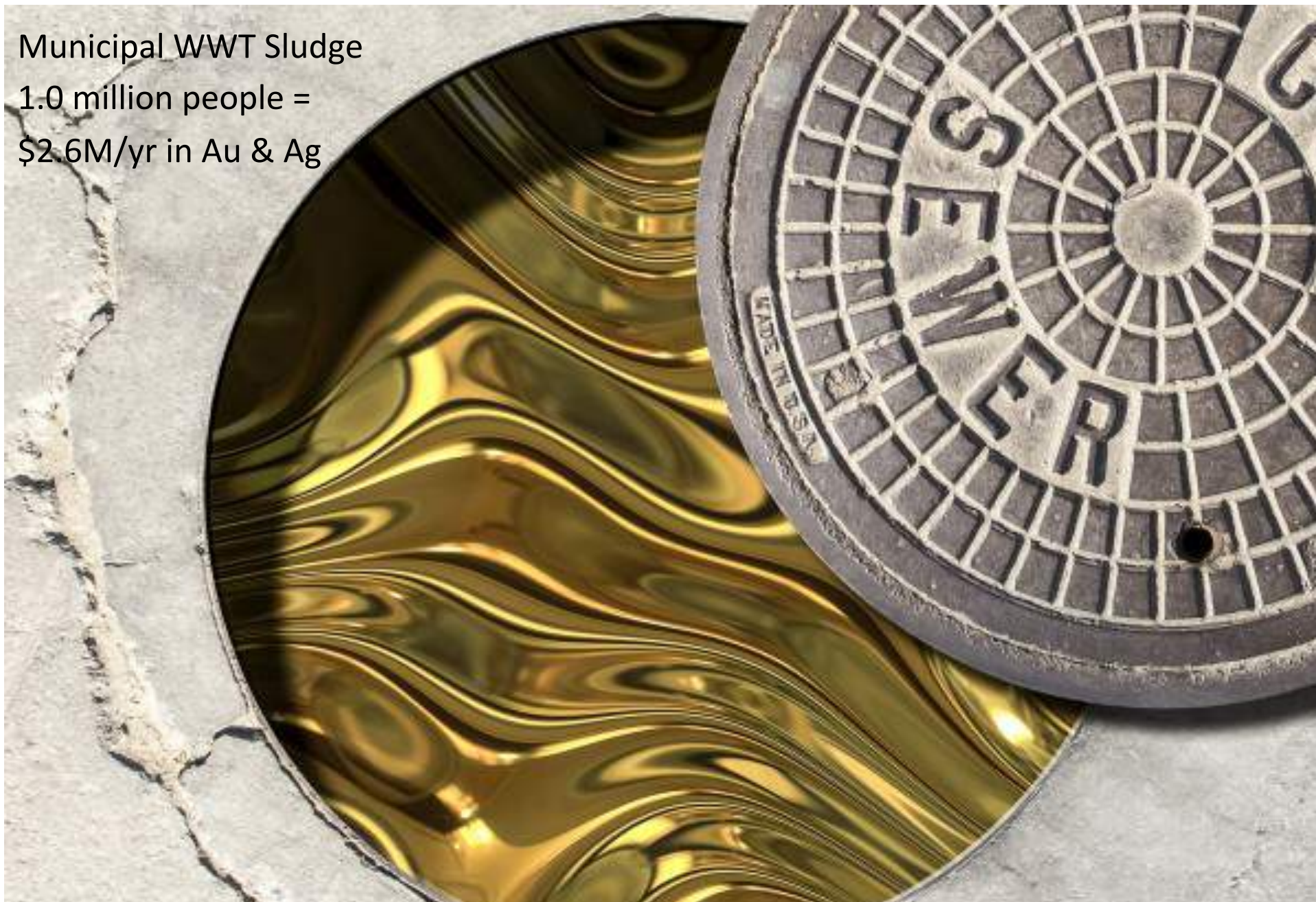


五厕位配置清单

系统名称	部件名称	描述	数量
外观	箱体	彩钢板	1台
卫生间	卫生洁具	带洗手节水坐便器	5只
		小便斗	5只
水处理室	处理槽	收集水箱	1只
		厌氧反应槽	1只
		电极反应器	4只
		高位水箱	1只
	电极		4套
供电系统	太阳能板	300W	13块
	蓄电池	24V 300HA	2台
电控系统	全自动运行		1套



Municipal WWT Sludge
1.0 million people =
\$2.6M/yr in Au & Ag



Westerhoff et al., *Environ. Sci. Technol.*, 2015, Characterization, Recovery Opportunities, and Valuation of Metals in Municipal Sludges from U.S. Wastewater Treatment Plants Nationwide