

# Nano ElectroChemical Waste Water Treatment



(Self Contained and Self Sustainable Toilet)



By: Cheng K.L

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# CLEAN AT SOURCE, SAVE MILLIONS



**NANOPAC<sup>®</sup>**

*We specialized in  
nanotechnology and  
environment engineering*

**USD 600 billion  
market**

Source: Lux Research

**Nano Electro Chemical Reactor**



*Granted*

*Pending*



**BILL &  
MELINDA  
GATES  
foundation**



**SGS**



- Cheap, easy, fast & save millions dollars
- Easy & cheaper to operate
- Modular and scalable
- No chemical to induce & environmental friendly



Year	Project
2011-2013	R&D
2014-2017	Pre Commercialization
2018 - 2022	Full Commercialization



PhD



Professor



Professor



PhD



PhD



PhD



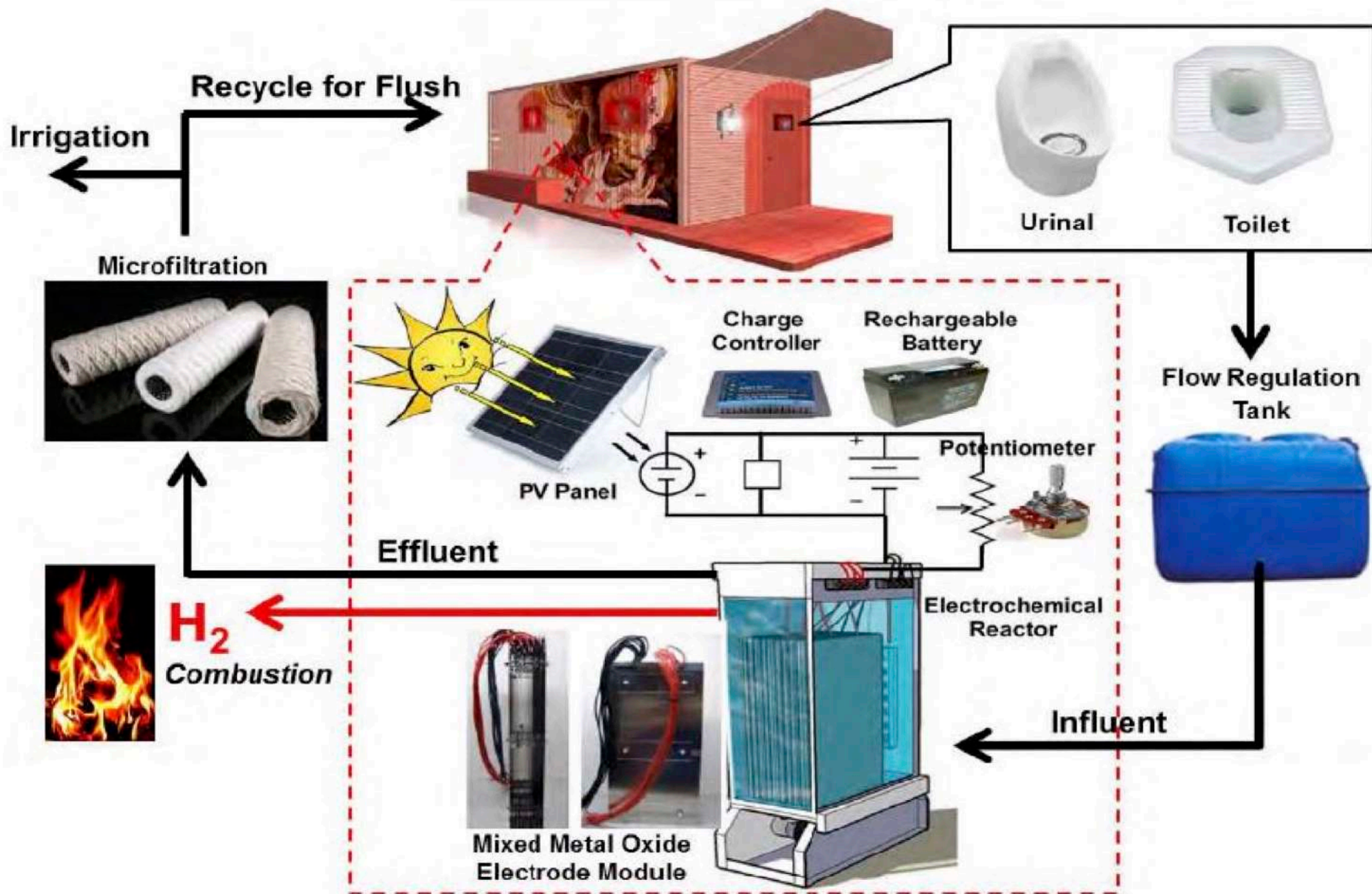
**Caltech**



**NANOMALAYSIA<sup>™</sup>**



# POC DESIGNED

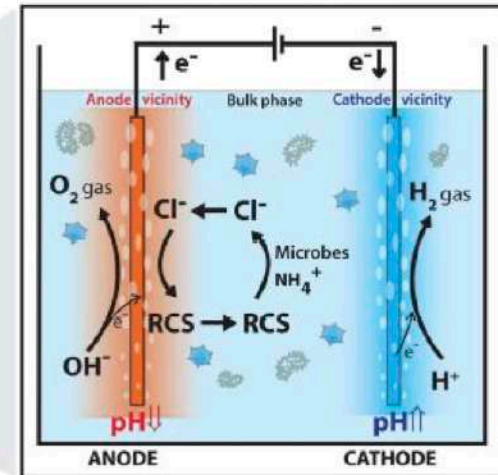


# POC DESIGNED

Solar-powered Mobile Toilet



Wastewater Electrolysis Cell



## Direct Oxidation/Reduction

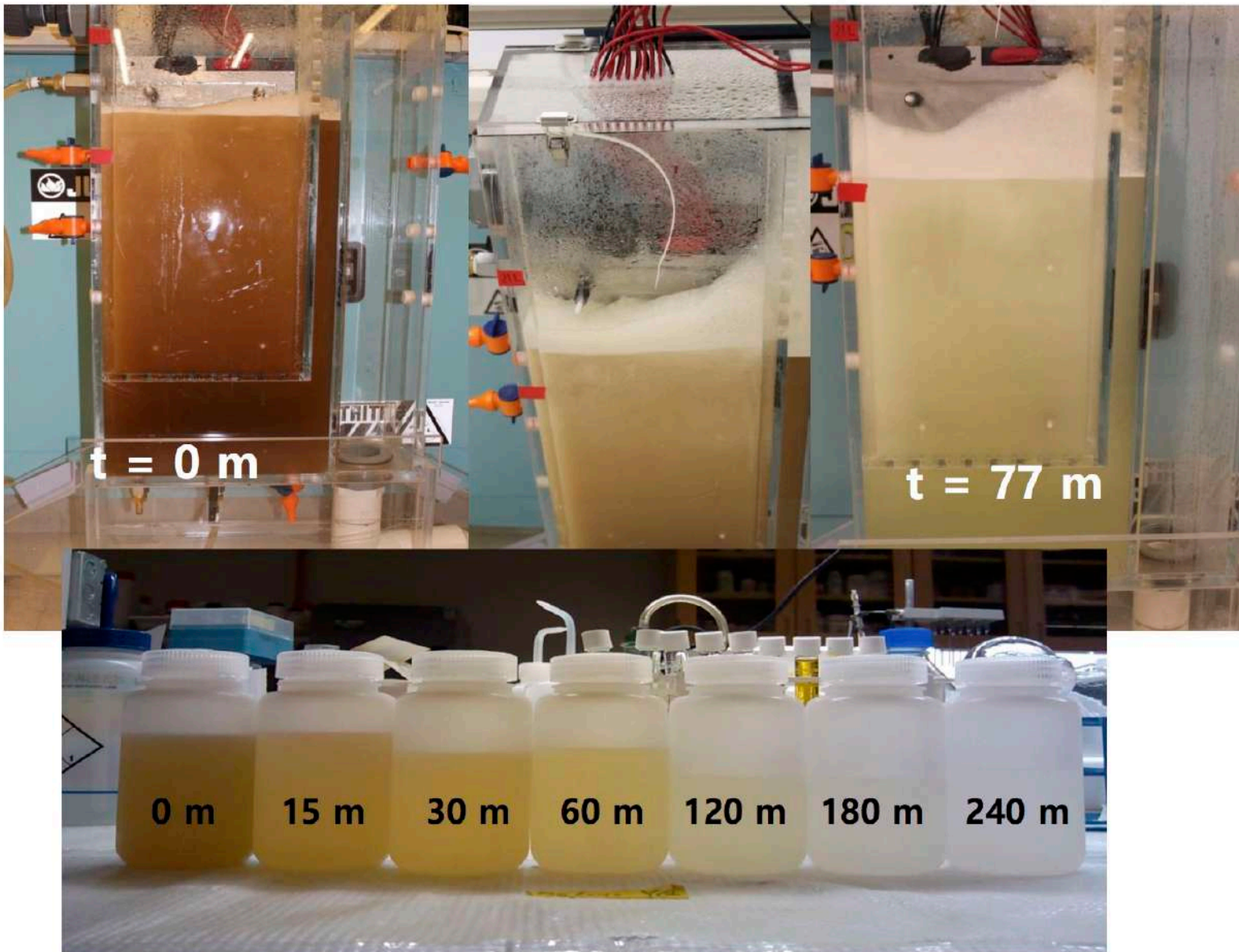
- $MO_x(\cdot OH) \{ h^+ \}$
- Stainless Steel Cathodes  $\{ e^- \}$

## Indirect Oxidation

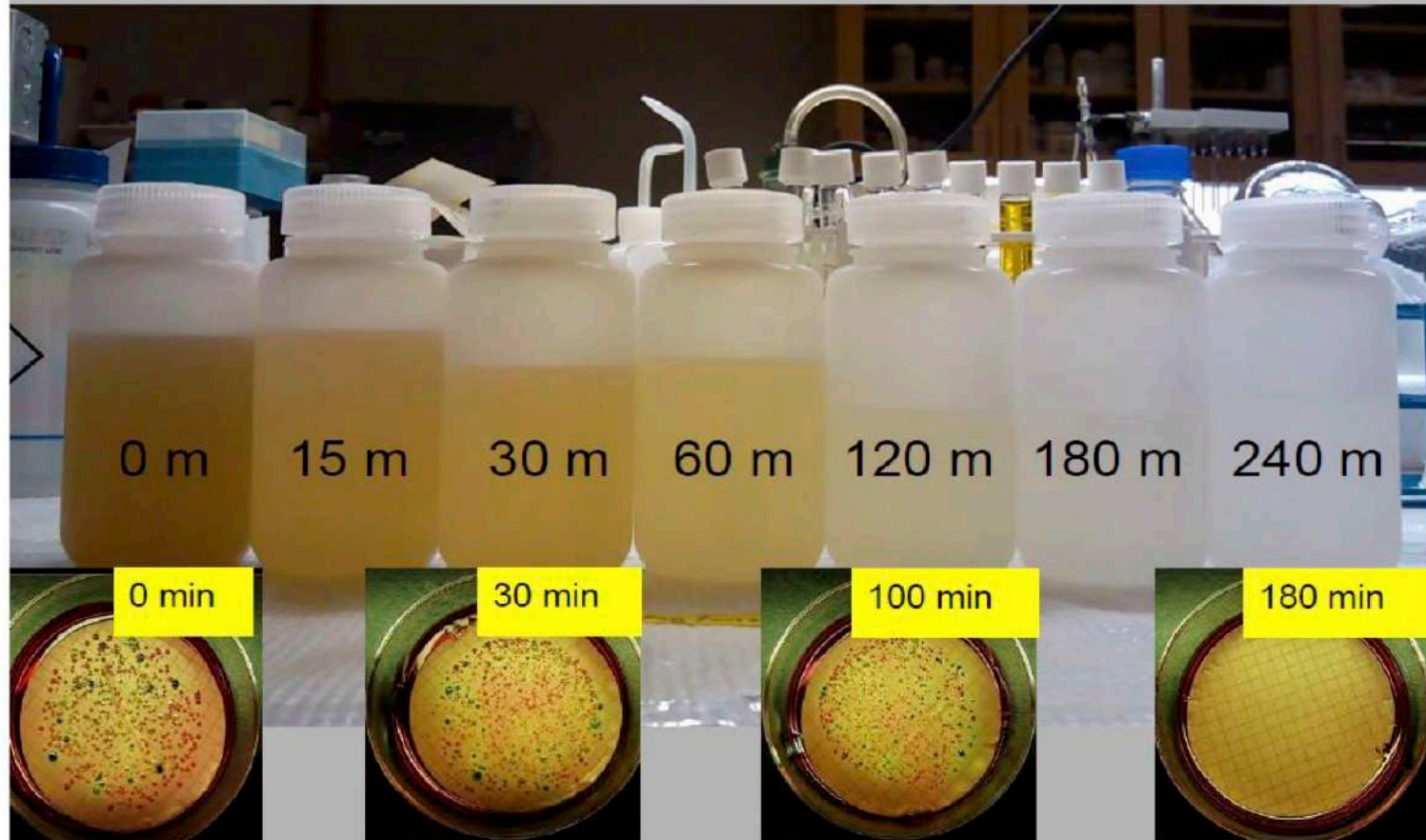
- Reactive Chlorine Species
- Chlorine ( $Cl_2$ ,  $HOCl$ ,  $ClO^-$ )
- Chlorine Radicals ( $Cl\cdot$ ,  $Cl_2\cdot^-$ )



# Electrochemical Toilet-waste Treatment



## Color Changes & Total Coliform Disinfection vs. Time





# Electrochemical Disinfection: Total Coliforms vs. Time

0.01 mL, t = 0 min

0.1 mL, t = 30 min

0.1 mL, t = 60 min

0.1 mL, t = 100 min



0.1 mL, t = 120 min

1 mL, t = 180 min

1 mL, t = 240 min

2013 - 2015

## Pilot Scale Experiments (Caltech)



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2014- 2015

## Demonstration Toilet-1



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**Caltech campus demonstration  
toilet (USA)**  
**WeCO demonstration toilet  
(Paris)**

**Ahmedabad Municipal Park/  
Mahatama Gandhi University  
(India)**

**Nanopac(M)  
Green toilet  
(Malaysia)**



**Kohler system for houses  
(USA)**

**2013 - 2015**



# Application fields

## ▪ Environment



**Livestock wastewater**



**Agriculture and Industry wastewater**



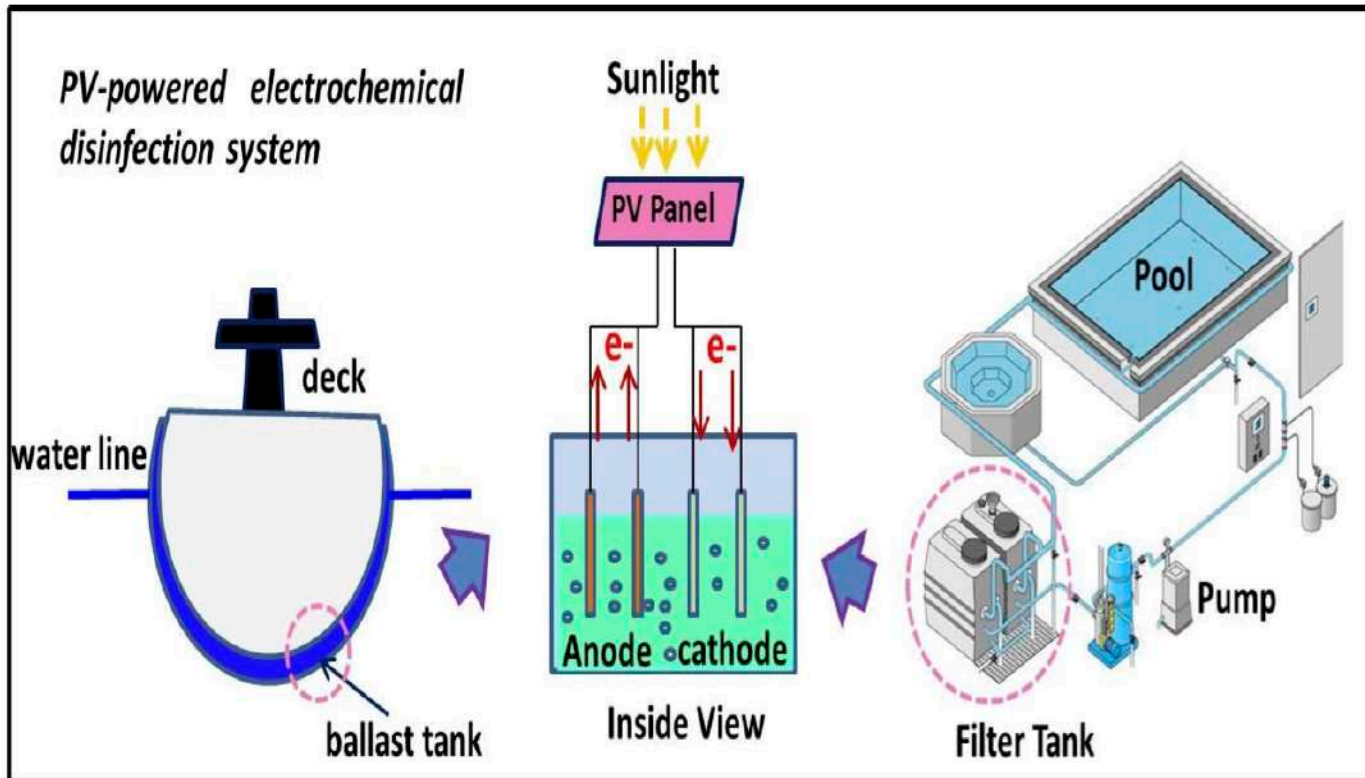
**Household wastewater**



**Rain treatment**



## Application Areas



# Applications



**Anti-microorganism of  
Toilet Bowl water**



**Anti-Bac humidifier**



**Water clean for fish  
tank/fish farm**



**Swimming pool  
water clean**



**Anti- microorganism water  
production system**

## Electrode kit for Customer : Hygienic washing Dish , fruit and vegetables





Kill microorganism in fish tank and remove green algae ;  
Customer kit



Electrode kit for fish tank



# Thank you

Contact Us:

***NANOPAC (M) SDN BHD***

***Address: 23, Jalan MJ 16, Taman Meranti Jaya, 47120 Puchong,  
Selangor, Malaysia***

***Tel (General line): +603-80513098***

***E-mail: [info@nanopac.com.my](mailto:info@nanopac.com.my)***

***<http://www.nanopac.com.my>***