Hand Cranked Portable UVC–LED Sterilizer

People who share light
Using appropriate technology with Light, help people who live in remote and disaster areas.
Motivation of UVC–LED sterilizer

700,000,000 people still drink seriously contaminated water.
1400 people die everyday due to waterborne diseases.

Sep. 2017, from East Timor
Goals to Pursue

- Do not need Electricity
- Do not need Consuming parts
- Sterilize Germs in short time
- Should be durable and safe to use
What is UVC Light?

From 2018 Yole report

UVC (200 - 280nm):
Also known as shortwave UV or deep UV; includes germicidal UV (253.7nm wavelength) used for air, water, and surface purification. Unintentional overexposure causes transient redness and eye irritation, but does NOT cause skin cancer or cataracts.

UVB (280 - 315nm):
A small but dangerous amount of sunlight. Most solar UVB are absorbed by the diminishing atmospheric ozone layer. Prolonged exposure can be hazardous to human eyes and skin, but it has beneficial effects for vitamin D production and treatment of severe skin diseases.

UVA (315 - 400nm):
Longwave UV, also known as "blacklight", represents the dominant UV in sunlight and is responsible for skin tanning. UVA is generally not harmful and can be used in medicine to treat certain skin diseases.
How to UVC light kill Germs?

- **Germicidal lamp** (254 nm) has peak effectiveness at 265 nm.
- **UVC Exposure** destroys DNA by breaking bonds.
- **Forming Dimer** involves UV radiation creating (2+2) cyclobutane adduct and 6-4 photoduct.
- **The Spectrum of Light** shows UV-C radiation (254 nm) is most effective for disinfection.
How to make UVC light?

There is no UVC light on earth!

Low Pressure Mercury Lamp
254nm UVC

- Safety issue (Mercury)
- Under environmental regulation
- Bulky and Fragile
- Life time issue
- Low cost

UVC-LED
260nm ~ 280nm UVC

- No environmental issue
- Small size (3.5mm) & easy handling
- Long life time (semi permanent)
- High cost
- Under rapid technology progress

ShareLight
world first
Hand cranked portable UVC–LED sterilizer, **PuriLight**

![Image of PuriLight](image)

- **UVC–LEDs module**
- **Handy generator**
- **Multi functional container**

- 1 USA patent application
- 4 Korean patents application
Test result of sterilization

Sterilization result (E.Coli, 5x10⁴ CFU/ml)

- 60초
- 90초
- 120초

2L Water
Surface

log

90%
99%
99.9%
99.99%
99.999%
-6
Characteristics of the PuriLight™

- **10 UVC-LEDs** (each 4mW) module
  - Powerful and uniform light distribution
- **4 inch Sapphire window**
  - High transparency and robust
- **20W handy generator**
  - Stable power generation
- **Drawer type container**
  - Convenient and easy to clean
  - 2L water at a time
- **Safe and easy operation**
  - Magnetic sensor and waterproof circuit
Strength of PuriLight

- **Anytime and Anyplace**
  - Do not need Electricity
  - Do not need any consumable parts

- **Sterilize both water and goods**
  - Improve personal hygiene

- **Long life time**
  - UVC LED is semi-permanent

- **Safe operation**
  - UVC light can not come out of water container

- **Lighting function**
  - Can use illumination light for emergency and reading
Sterilizing mode Operation

- >99.9% in 2 mins
- 2L safe wafer
Lighting mode Operation

✓ 2W lighting function
Who needs PuriLight?

- **People who live in the drinking wafer problem areas**
  - No electricity infra or unstable area

- **People who are suffering from disasters**
  - Water and goods contamination with infra destruction

- **NGO staffs and relief activists**
  - Safe life in harsh environment

- **For all**
  - personal hygiene

*Filtered Water ???
Still need sterilization !!!*
Our first plan with PuriLight

Area: Mikese area, Tanzania
Major drinking water: Rainwater in reserve tank
Problem: seriously contaminated

250ea PuriLight distribution in Jan. 2019
Help more than 1000 people
Save Life with Light

Thank you

KOICA CTS program is supporting this project