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Preventing infectious diseases using UV LEDs for water disinfection

Access to safe drinking water is crucial for promoting human health and well-being. Contaminated drinking water represents a significant risk for waterborne infections. Water disinfection using Ultraviolet Light- Emitting Diodes (UV LEDs) is a new method to disinfect water effectively without adding chemicals to the water. Compared to mercury lamps, which are traditionally used for UV water disinfection, UV LEDs offer the advantage of a longer lifespan, compact devices that can be integrated into other systems, and customized wavelengths, which can be used to target different pathogens specifically. Furthermore, UV LEDs do not contain toxic mercury.

The objective of this study was to investigate the inactivation of Escherichia coli (E. coli) and Enterococcus faecalis (E. faecalis) by using 280 nm UVC led light. Our study showed that this wavelength is extremely efficient for water disinfection with log inactivation of more than Log 6 for E.coli and more than Log 5 for E. faecalis when illuminated for less than one minute. Furthermore, a new system based on 395 nm UVA light combined with a solar cell was investigated. The combination of solar cells and UV LEDs creates a self- sustaining system, which is a proposed solution for water disinfection in rural areas, disaster zones, and flooded areas, where access to safe drinking water is crucial. The UV LED disinfection technology offers promising solutions to improve water safety and quality, leading to positive public health outcomes.

Audience Take Away Notes

- The audience will learn about UV LED photoactivated disinfection of bacteria and how the level of disinfection is calculated
- The audience will learn that LED Technology has a huge innovation potential in many companies
- The new LED technology is a hot topic for students in Electronics Engineering at Universities
- The combination of solar panels and UV-LEDs provides a practical solution of how to use the technology in rural areas, disaster zones and flooded areas

Biography

Thea Hein Petersen has a bachelor's degree in General Engineering from the Technical University of Denmark. During her bachelor, she studied for a semester at the University of California Berkeley, where she focused on Technical Entrepreneurship and Innovation. This experience allowed her to gain insight into the process of transforming technical knowledge and ideas into successful companies. She is currently perusing her master's degree in Sustainable Energy at the Technical University of Denmark.