

Light Emitting Diode (LED) Ultra-violet (UV) Disinfection of Water

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This project intends to evaluate the effectiveness of pulsed gallium nitride (GaN) light emitting diode (LED) ultraviolet (UV) lamps to disinfect drinking water. This project will employ a novel probe configuration of an array of LED lamps encased in acrylic which can be immersed in water. Another innovative feature of this project will apply pulsed current to the LEDs rather than continuous current which is expected to reduce the power requirements of such a water disinfection device as well as extend the life of the LED lamps. Specifically, we aim to answer the following research questions:

- a) How well does a pulsed LED UV light disinfect water with *Bacillus subtilis* spores compared to LED UV light with continuous current.
- b) How much less power does the pulsed current configuration require compared to continuous current configuration.
- c) How long does the pulsed LED UV lamp remain effective compared to the continuous current configuration.
- d) What is the relationship between pulse width and peak power on the effectiveness of LED UV light for disinfecting water containing *Bacillus subtilis* spores.

This project aims to develop a novel water disinfection device that has wide-reaching applications for workers and other personnel in austere environments, such as military personnel deployed to Forward Operating Bases (FOBs) and those struck with disaster who have disrupted access to safe drinking water.

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**University of Cincinnati
13th Annual
Pilot Research Project
Symposium
October 4-5, 2012**

Main Menu

Hosted by: The University of Cincinnati Education and Research Center
Supported by: The National Institute for Occupational Safety and Health.
(NIOSH) Grant #: T42/OH008432-07

- ◆ **Welcome and Opening Remarks**
- ◆ **Keynote Speakers**
- ◆ **Podium Presentations**
- ◆ **Poster Presentations**
- ◆ **Video Montage of the 13th Annual PRP Symposium**
- ◆ **Participating Universities**
- ◆ **Steering Committee Members**
- ◆ **Acknowledgements**
- ◆ **Problems Viewing the Videos**

Produced by Kurt Roberts Department of Environmental Health
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