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NIH-AIDS: Portable Surgical Instrument Sterilizer

KWJ Engineering has developed an ozone based, portable and solar powered sterilizer for surgical tools and sharps under the NIH SBIR program. The proposed technology is significant since the instrument will serve as a miniature, low power and low cost platform capable of decontamination of viral pathogens such as HIV, Hepatitis B and Hepatitis C (HBV, HCV). The technology will be useful in reducing accidental infections arising from the large number of sharps injuries among medical personnel worldwide.

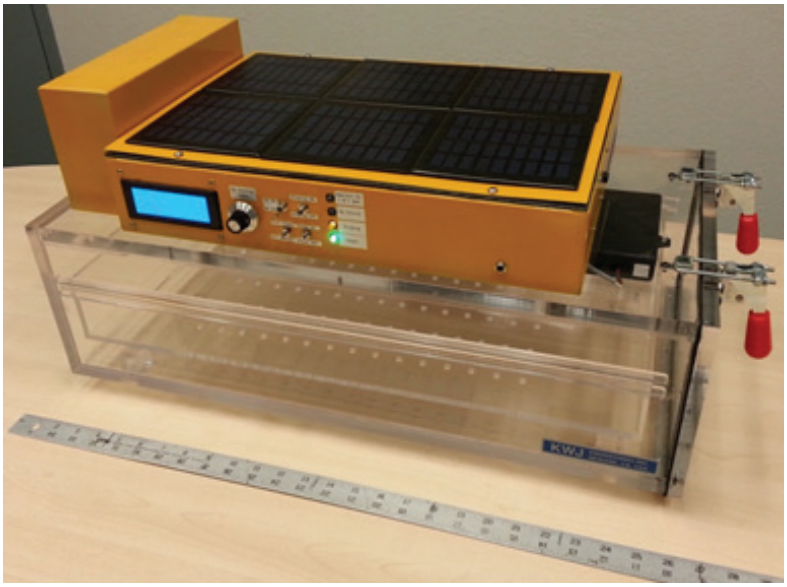

Figure 1. KWJ surgical sterilizer

The sterilizer incorporates a KWJ designed micro-plasma generator for the production of ozone in a compact design. The prototype has a sterilization chamber with ozone sensors (KWJ designed) and process controller to monitor cycle time and ozone concentration prior to ambient exposure after the sterilization cycle. The sterilizer prototype is pictured in Figure 1.

The sterilization technology is an improvement over technologies that are commercially available due to the ease of ozone generation from atmospheric air and its subsequent degradation to oxygen with no generation of residual by-products or hazardous species. Medical sterilizers available on the market today are primarily steam-based, with ethylene oxide and hydrogen peroxide plasma as other alternatives. Steam-based autoclaves, while effective, are energy intensive, while ethylene oxide is a toxic gas and can leave behind residuals. These sterilization methods, while adaptable for hospitals, cannot be used as portable sterilization solutions for field operations. In addition, other chemical alternatives require replenishing of reagents and regular maintenance. The sterilizer is portable, light-weight, with relatively low power consumption and low cost, requiring virtually no maintenance and will be deployable for mobile applications such as disaster relief and military combat scenarios where rapid and on-site sterilization is required for field surgical procedures. The simplicity and versatility of the system also provide a means to implement safe sharps-related recycling and disposal protocols using ozone as the primary disinfectant, thereby addressing a critical area of concern regarding transmission of diseases through percutaneous sharps injuries as related to public health and safety.