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UGA PROFESSOR DEVELOPS ELECTROSTATIC SPRAY APPLICATION OF DECONTAMINATION AGENTS AS A BIOTERRORISM COUNTERMEASURE

ATHENS, Ga. – A research team at the University of Georgia has developed an electrostatic spray that could save lives following a terrorist attack involving chemical or biological weapons. S. Edward Law of the Applied Electrostatics Laboratory led the team, which invented a process and apparatus that can quickly and effectively decontaminate the skin of humans without producing large amounts of contaminated waste, whose subsequent safe disposal would require another step in hazardous materials handling.

The findings were announced at the recent Institute of Physics 2003 Conference on Electrostatics in Edinburgh, Scotland.

The apparatus, incorporated with a polyethylene booth designed for effective mobility, is based on an electrostatic system that sprays a finely atomized mist to apply the decontaminating compound, such as antitoxins and disinfectants. The spray-charging attributes were designed to be especially compatible with the engineering and safety constraints necessary for application to human skin. The tiny droplets have what Law has described as "adequate residual aerodynamic energy to convey and penetrate the electrified droplets into Faraday-shielded regions"; in other words, the droplets are charged to effectively reach the skin of the armpit and groin areas.

Electrostatic spraying has found many industrial applications in providing even and complete coating, from applying paints to such manufactured goods as automobiles to innovative agricultural uses for environmentally friendly pest-control applications to crops. Law's laboratory in UGA's Department of Biological and Agricultural Engineering has previously developed innovative electrostatic spraying systems for industry and agriculture. But in the current international political climate, Law, along with Steven C. Cooper of UGA's patent licensee Electrostatic Spraying Systems, Inc., and UGA microbiologist Mark A. Harrison, was motivated to make a contribution toward protecting people, both civilians and the armed forces, who may be exposed to biological and chemical agents.

The walk-through booth is outfitted with several microprocessor-controlled atomizing nozzles, electrically wired so that the droplets of decontaminant solution are electrostatically charged and thus stick to the skin of the recipient. Law posited in his IOP presentation that 90 people an hour can be sprayed head to foot with 100 milliliters each of decontaminating spray. Only about 20 milliliters is wasted in the process.

"An important feature retained in our engineering design is mobility; the booth is not restricted to hospital use and provides relatively high human throughput for protective treatment," said Law. "What remains to be evaluated is the control efficacy of decontaminant sprays which are specific to likely biological warfare agents," he continued. Discussions with international conferees following the IOP presentation led to hypotheses for further investigation regarding the approximately 50-fold increase in bactericidal efficacy resulting from the 2-fold increase in deposition achieved by the electrostatic forces of attraction of the charged decontaminant sprays onto the body.

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