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Real time detection, monitoring and modeling of biological threats

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Abstract

Biological threats comprise potential terrorist attack or spread of disease through various infection routes, such as surface contact and ingestion of infective agents through touching, eating or breathing. Being able to detect and monitor biological contaminants is essential to enable effective measures to be taken to reduce or eliminate the threat; these may include treatment and remediation or containment. Modeling routes to infection serves to identify critical points that need control and the likely consequences on the scale of infection for a given outbreak.

Current work is addressing real time detection of microorganisms using laser optical techniques such as a biodynamic speckle and laser induced fluorescence. With biodynamic speckle, constructive and destructive interference from microorganisms produces characteristic details. Laser fluorescence produces characteristic spectral information of the cell or specific molecules, helping detection and identification.

Models of contamination and probability of infection on aircraft have been developed as a means to assess the efficacy of decontamination treatments, and identify important factors in reducing risk, control and abatement.

Biography

Watson completed his Ph.D from the University of Glasgow in 1993, studying the optimization of the gaseous discharge and optical coupling of a high power, pulsed CO_2 laser. He began lecturing in 1990 and became senior lecturer in Laser Systems Engineering in 1998. He has investigated the effect of laser and combined systems, including flashlamp, UV, microwave, ultrasonic and chemicals such as ozone, on decontamination of microorganisms and extending the shelf-life of food. He is on the editorial board of the Journal of Food Processing and Technology.