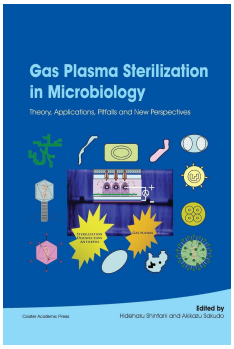
Gas Plasma Sterilization in Microbiology

Theory, Applications, Pitfalls and New Perspectives



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Gas plasma is the fourth state of matter, alongside solid, liquid, and gas. There are many naturally occurring events and man-made products related to gas plasma including: aurora, thunderstorms, high-intensity discharge headlamp bulbs, oxonizers, semiconductors, and solar battery panels. A gas plasma is generated by removing electrons from a gas, e.g. N(2), to produce a highly excited mixture of charged nuclei and free electrons. It has enormous potential as a broad spectrum antimicrobial sterilization procedure with applications in medical, industrial and agricultural settings (e.g. decontamination of medical instruments). A major advantage is the shallow penetration of gas plasmas: only ~10-20 nm from the surface thereby minimising damage to the material being sterilized. An important obstacle to overcome is the 'understanding-gap' between the engineering researchers who are developing the gas plasma sterilization technology and the microbiologists who aim to fine tune it for their needs. This timely volume aims to bridge that gap, permitting engineers and microbiologists to develop more coherent multidisciplinary strategies.

The book opens with introductory chapters that explain the background and principles of gas plasma sterilization and outline the possible mechanisms of action. Requirements for achieving the 'gold-standard' sterilization level i.e. a sterility assurance level (SAL) of 10(-6), is also covered. The next eight chapters cover applications of this technology: these range from the inactivation of spores and endotoxins to inactivation of viruses and seed-borne plant pathogens. The final chapters tackle sterilization validation (from several ISO documents), common data-interpretation errors and speculate about future trends.

This book is an indispensable reference for students, microbiologists, engineers, and laboratory scientists interested in sterilization and decontamination.

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