UV Light for Sterilization

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ABSTRACT

Ultraviolet light emitting diodes (UV LED) were used as a light source in TiO2 photocatalysis because of their many advantages such as long life, safety, low pollution etc. In this experiment a light source panel was fabricated with UV LED, the light intensities of which were relatively uniform. When in case of using TiO2 - LED all implantable devices must be sterile. However, autoclaves produce poor surface properties that jeopardize the integration process. Forty eight Titanium implants were contaminated with spores of the biological indicator Bacillus Stearothermophilus and subjected to dynamic sterilization by Ultraviolet light. The effectiveness of UV light depends on the length of time a micro organism is exposed to UV. “sterilization” is often misquoted as being achievable. While it is theoretically possible in a controlled environment. Increase in effectiveness and UV intensity can be achieved by using reflection. Aluminum has the highest reflectivity rate versus other metals and is recommended when using UV.

INTRODUCTION

In 1878, Arthur Downes and Thomas P. Blunt published a paper describing the sterilization of bacteria exposed to short wave light. It was discovered that wavelength around 250 nm were most effective for inactivation of bacteria. Over the years, UV costs have declined as researchers develop and use new UV methods to disinfect water and waste water. Currently, several countries have developed regulations that allow systems to disinfect their drinking water supplies with UV light. UV light range are the most effective penetration cells and damage the nucleic acid, rendering them incapable of reproduction or microbiologically inactive. This process occurs in nature, the sun emits UV rays that perform this way. UV lamps utilize the wavelengths of 200-800 nm which is the range effective for killing bacteria. With each advancement and innovation comes an exciting change from today’s standards and expectation to improve performance and features. A classic example of this is the switch from tube monitors which are heavy and bulky to LCD or LED monitors. The determination of design and operational conditions of ultraviolet light emitting diode (UV-LED) / TiO2 device is the major concern for the development and potential application of the photocatalytic process. The (UV-LED)/TiO2 device was studied under various conditions including initial dye concentration, the mass of catalyst, light power and pH value. UV-LED was found to be technically and actually feasible. Besides, our results show a promising technique for organic waste-water treatment by the (UV-LED)/TiO2. Ultraviolet light emitting diode (UV-LED) was applied instead of traditional UV-lamp to activate the TiO2 composite. Photovoltaic was introduced to utilize solar radiation as an energy source of UV-Led. TiO2, one of the most promising photocatalysts, has attracted considerable attention in recent years due to its high oxidative power, abundance chemical stability, environmentally friendly and low cost. TiO2 thin film was synthesized on the surface of 304 stainless steel sheets using a simplified sol-gel preparation methods. Hospitals use UV lamps to sterilize surgical equipment and the air in operating theatres. Food and drug companies also use UV lamps to sterilize their products. Large doses of UV can damage the retina in your eyes, so it is important to check that your sunglasses will block UV light.

MATERIALS AND METHODS

In sterilization process some equipment are used.

- Hygienic storage medical UV sterilizer is used.
- Four E’s scientific small footprint bacticinerator sterilizer is used.
- High efficiency ultraviolet LED sterilization dental mobile portable medical equipment SPA UV sterilizer can be used.
- Commercial UV cream sterilizer medical UV sterilizer / UV light sterilizer for dental is used.
- UV medical sterilizer / UV light sterilizing machine / UV sterilization equipment with high working pressure for medical purpose is used.
- In operation theatre, UV medical sterile water disinfection is used.
- Medical UV sterilizer hospital sterilization knife sterilizer is used.
- During operation and before operation, operation theatre must be cleaned so intelgintize medical air sterilizer air purifier for hospital and patient with UV light is used.
- “Peide” company launched medical equipment; medical swimming pool aquarium hospital pond aquaculture fish farm UV sterilizer is used.
DISCUSSIONS

1. Air disinfection

UVGI can be used to disinfect air with prolonged exposure. Disinfection is a function of UV intensity and time, for this reason it is not as effective on moving air, when the lamp is perpendicular to the flow. In UVGI system can be free standing units with shielded UV lamps that use a fan to force air past the UV light. Other system is installed in forced air systems so that the circulation for the premises moves microorganisms past the lamps. Key to this form of sterilization is placement of the UV lamps and a good filtration system to remove the dead microorganisms.

2. Water sterilization

A portable, battery –powered, low pressure mercury – vapor discharge lamp for water sterilization is used. Ultra violet disinfection of water is a purely physical, chemical-free process. Even parasites such as cryptosporida or giardia, which are extremely resistant to chemical disinfectants, are efficiently reduced. UV can also be used to remove chlorine and chloramine species from water this process is called photolysis. The sterilized microorganisms are not removed from the water. UV disinfection does not remove dissolved organic, inorganic compounds or particles in the water. However, UV oxidation processes can be used to simultaneously destroy trace chemical contaminants and provide high –level disinfection.

3. Foods

One of the first step to sterilize the foods by UV light. Application of UV light over a suitable period slowed the decay of foods and various liquids, preserving them for safe consumption for a longer time.

4. Medicine and Surgery

In general, surgical instruments and medications that enter an already aseptic part of the body (such as the bloodstream, or penetrating the skin) must be sterile. Examples of such instruments include scalpels, hypodermic needles and artificial pacemakers. All are sterilized by UV light.

5. Spacecraft

There are strict international rules to protect the contamination of solar system bodies from biological material from earth, standard vary depending on both the type of mission and its destination. Many components of instruments used on spacecraft can not withstand very high temperature, so techniques not requiring excessive temperatures are used as tolerated, including heating to at least 120° C, chemical sterilization, oxidation ultraviolet and irradiation.

6. Surface Sterilization

UV lamps disinfect surfaces without chemicals, which is crucial in many industries. In the food industry UV lamps are used for irradiation. UV light can kill viruses, bacteria, yeast and fungi in second. UV light applications are used for filling equipment, conveyor belts, transport containers and working surfaces of foodstuffs.

REFERENCES

[2] Britannica volume 12,page 118.UV radiation because of its bacterial capabilities at wavelength of 260-280 nm.UV is useful as both a research tool and a sterilizing technique.