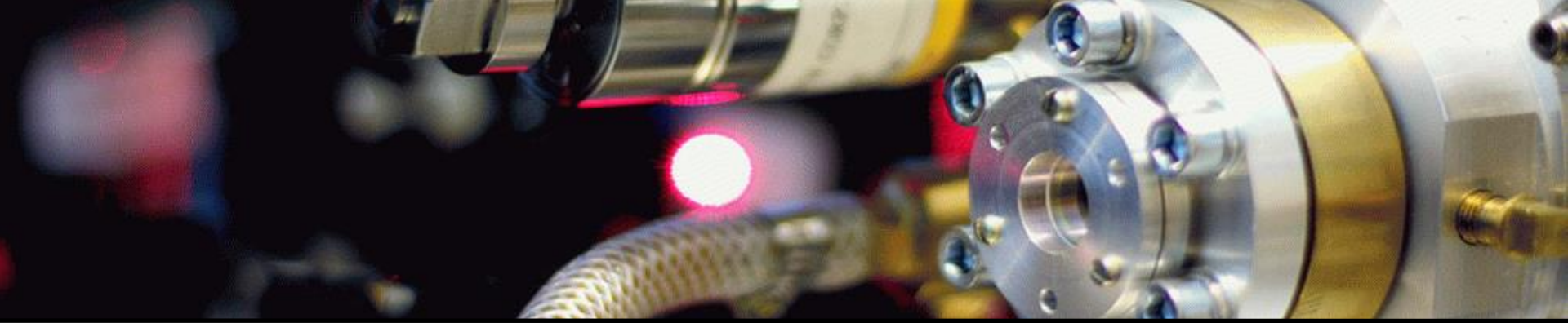




ULTRAVIOLET LASER FOR FOOD INDUSTRY

Innovative CleanTech and energy-efficient solution

HyacinthLux Oy



HYACINTHLUX BACKGROUND AND DEVELOPMENT STAGES

READY

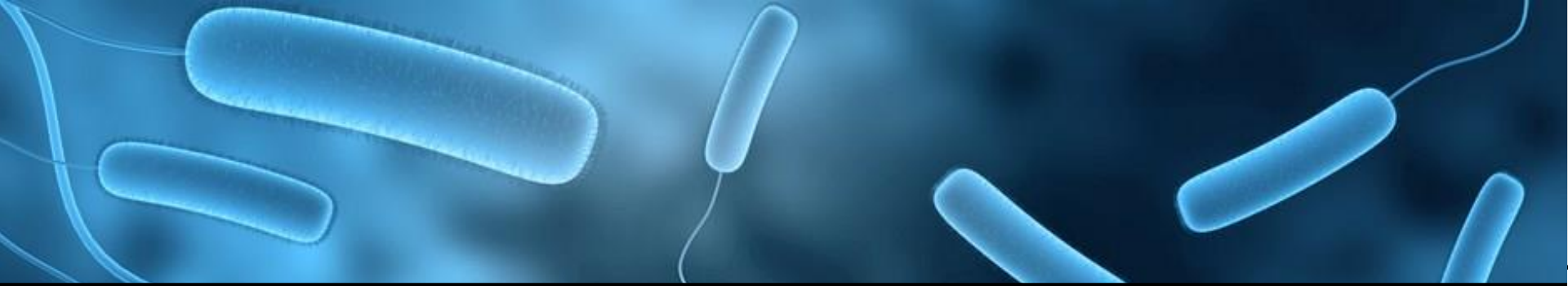
- DEVELOPMENT OF UV LASER DEVICE FOR HUMAN TREATMENT
- DEVICE TEST AND CERTIFICATION (IN RUSSIA)
- TECHNOLOGY IMPROVEMENT TO SURFACE STERILIZATION

- SURFACE STERILIZATION DESKTOP DEVICE FABRICATION



NEXT STAGE

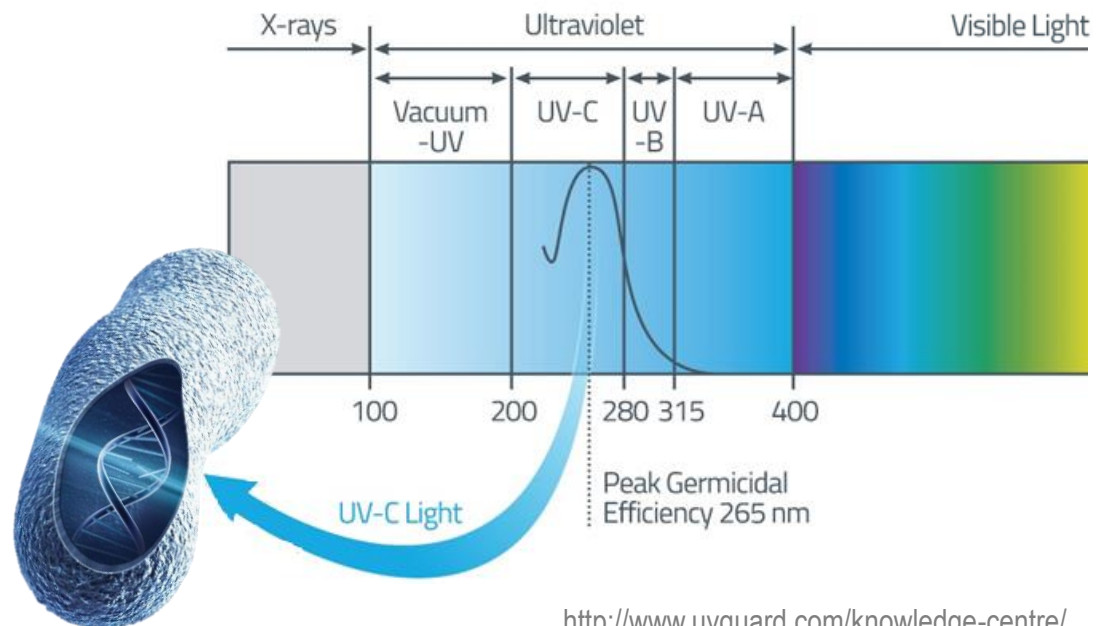
- TESTS ON BACTERIAS
- SERIAL DEVICE FABRICATION AND TESTING
- PREPARATION FOR STARTING OF PRODUCTION



HYACINTHLUX TECHNOLOGY

- **Maximum** germicidal **sensitivity** of microorganisms is **at 265 nanometers (nm)**. Therefore the most efficient way to **deactivate** and **shutdown** their **reproductive processes** is to use germicidal energy of $265 \pm$ few nm wavelength.
- HyacinthLux developed a UV laser technology that employs **266 nm light** the most closed to 265 nm.

Microorganisms light sensitivity



<http://www.uvguard.com/knowledge-centre/>



HYACINTHLUX FOR FOOD INDUSTRY

- **HyacinthLux disinfection for food packaging**

the disinfection of packaging and surfaces, such as in filling and sealing machines for products

- **HyacinthLux disinfection for food conveyers**

- food can be scanned with the HyacinthLux device;
- the conveyor line could be disinfected with the device allowing the UV 266 nm going inside the small cracks

- **HyacinthLux disinfection of food instruments**

including knives, plates, all surfaces engaged in food preparation



MARKET

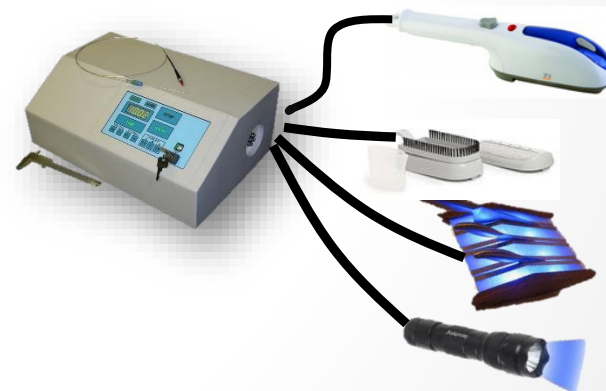
UV DISINFECTION EQUIPMENT

SURFACE DISINFECTION
AIR DISINFECTION
FOOD DISINFECTION

FOOD INDUSTRY
HEALTHCARE CENTERS
EDUCATIONAL AND DAYCARE CENTERS
CONSTRUCTION INDUSTRY (MOULD REMOVE)
WORK PLACES
TRANSPORT
HOMES
CLOTHES, BOOTS AND MANY OTHERS

HyacinthLux LASER

1 DEVICE = MULTI AREAS
APPLICATIONS



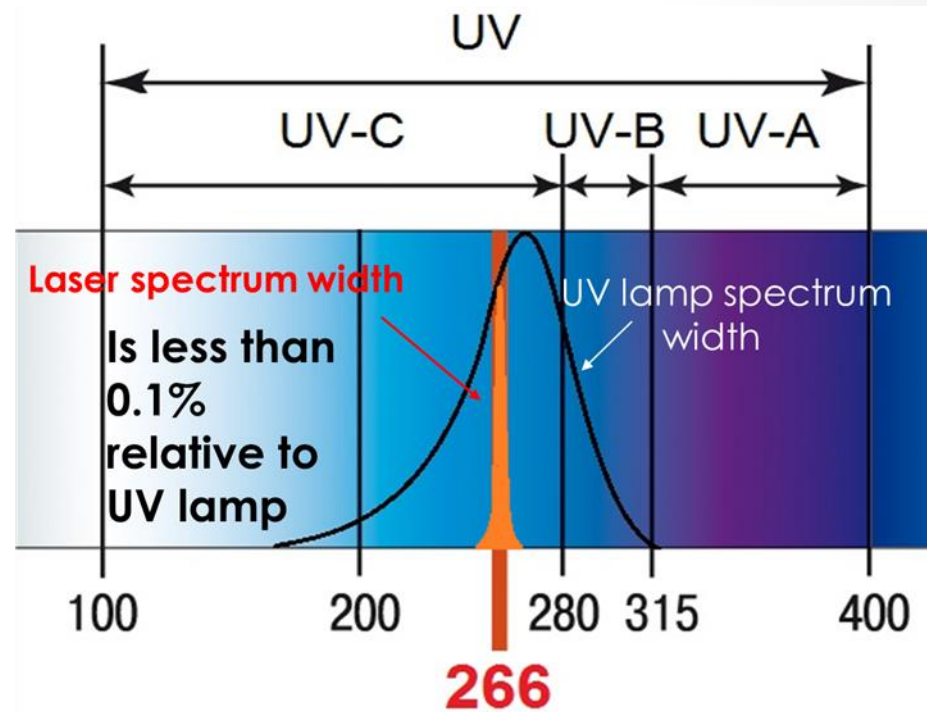
Surface, food and air disinfection

Tentative view of the device

COMPARISON WITH OTHER UV DISINFECTION SOLUTIONS

- The comparison is performed between UV lamp and HyacinthLux laser. We do not compare with UV LED's that have a very small life time.
- The narrower the spectrum, the higher the efficiency, the lower the time for the disinfection
- The HyacinthLux laser spectrum width is less than 0.1% relative to UV lamp.
- Therefore HyacinthLux 266nm laser is more than 1000 times efficient than UV lamp requiring three orders less time for the disinfection.

UV lamp & laser spectrum widths



UV laser is 1000× more efficient than UV lamp

COMPARISON WITH OTHER UV DISINFECTION SOLUTIONS

CHARACTERISTICS	UV LAMPS	UV LED'S	HyacinthLux UV LASER
Safety voltages	no	yes	yes
UV radiation wavelength, nm	180-315	320	266
Sterilization time	>300 sec per cm ²	average	<1 sec per cm ²
Efficiency	low	average	high
Life time, hours	1000	500*	100000
Possibility of radiation transporting by optical fiber	no	no	yes
Universality (different tips for different applications)	no	no	yes
Human safety	burns to eyes and skin	yes	yes
Compactness	no	yes	average
Price, k\$	low	average	average
Total cost (investment and cost-of-ownership)	high	high	low

Notes:

- UV diodes working in UV-C (B) regions have short life time without parameters degradation (100-500 hours);
- UV diodes working in UV-A region have not sterilization effect and can be used as a design solution for rooms only;

*- M. Kneissl and J. Rass (eds.), III-Nitride Ultraviolet Emitters, Springer Series in Materials Science 227, Switzerland 2016.



Thank you!

HyacinthLux Oy

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