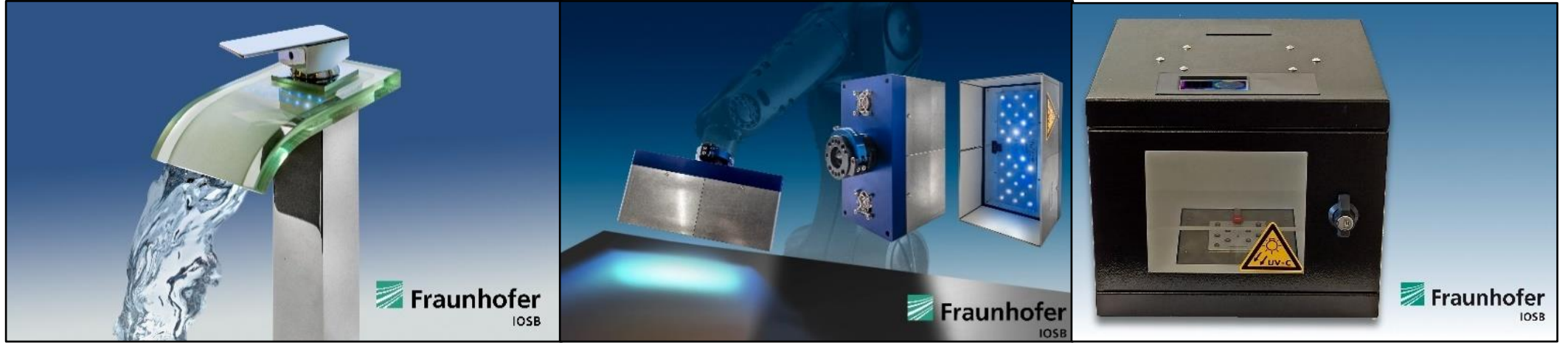


We are pleased to introduce you to Fraunhofer TechFlash - Fraunhofer's Flash News on latest and exciting technologies. This week's TechFlash is about "Semiconductor based UVC-Disinfection (UVC-LED)".

UVC-LED Disinfection



UVC-LED Faucet for Point of Use Water Disinfection

UVC-LED disinfection module for disinfection robots

Disinfection box for small medical devices

Fraunhofer Institute of Optronics, System Technologies and Image Exploitation (IOSB) has been conducting research for many years in the field of disinfection using UVC radiation to protect people from the effects of infections, epidemics or even pandemics. The experience of the last decades shows that the intervals between epidemic events are shortening. In addition to SARS, MERS, EHEC, Zika virus, bird flu and swine flu, SARS-CoV2 and monkeypox are currently serious threats. But even in everyday life, diseases caused by poor hygienic environmental conditions can affect everyone. Here, irradiation with UVC light offers a very efficient method of reducing the concentration of pathogenic microorganisms and thus the risk of infection. Besides spreading via the air (flu, SARS...) and food (salmonella, listeria, E. coli ...), contaminated drinking water is often responsible for many infections.

As part of the research consortium "Advanced UV for Life" (<http://www.advanced-uv.de>) funded by the German government, semiconductor-based UVC radiation sources (UVC LEDs) have been developed over the past 10 years as an alternative to classic radiation sources (Low Pressure Mercury Lamps - LPML). Fraunhofer IOSB is active in the research consortium as an application partner and is developing highly efficient processes and systems based on these UVC-LEDs for water, air and surface disinfection in the private, public and medical sectors.

Advantages of UVC-LEDs

UV radiation, especially in the UVC range, inactivates microorganisms very efficiently by destroying their DNA. UVC LEDs offer many, in some cases even outstanding, advantages over classic low-pressure mercury lamps (LPML):

- Extremely high mechanical stability (no risk of glass breakage as with LPML).
- Very well suited for mobile but also stationary applications
- Microbiologically much more efficient wavelengths
- Several wavelengths can be combined
- Very small, highly efficient radiation sources possible
- No heating phase, full power immediately
- No heat radiation to the front
- Well suited for clocked applications (e.g. Point of Use water disinfection)
- Completely new radiation source geometry and LED arrays (also in 3D) possible
- Operation with low voltage, battery and solar

Development of UVC-LED disinfection systems

The development of efficient UVC-LED disinfection systems is a complex multi-step process.

1. spectral and goniometric measurement of the single LEDs.
2. simulation of the radiation field of possible LED arrays by ray tracing
3. in case of surface disinfection - projection onto the surface to be disinfected
4. in case of water and air disinfection - addition of a flow simulation
5. determination of the radiation distribution on the surface or in the volume flow and determination of the irradiation dose
6. determination of the inactivation rate according to the effective spectrum for various microorganisms
7. iterative system optimization (steps 1-6) to maximize the inactivation rate

Our support for your product development

Based on its many years of experience in this research and engineering field, Fraunhofer IOSB-AST supports manufacturers of disinfection systems and users with technological consulting, simulations as well as prototype development (steps 1-7). We also offer technical testing and certification of UVC disinfection systems (including subassemblies) as a service. Our well-equipped UV laboratory with a wide range of measuring and testing facilities is available to our customers for this purpose. In the field of scientific research we are interested in cooperations with universities and research institutes with whom we can jointly advance this technology.

We look forward to your interest in discussing this exciting technology.

[Yes, I am interested](#)

About Fraunhofer-Gesellschaft:

The Fraunhofer-Gesellschaft, headquartered in Germany, is the world's leading applied research organization. With its focus on developing key technologies that are vital for the future and enabling the commercial exploitation of this work by business and industry, Fraunhofer plays a central role in the innovation process. As a pioneer and catalyst for ground-breaking developments and scientific excellence, Fraunhofer helps shape society now and in the future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 76 institutes and research institutions throughout Germany. The majority of the organization's 30,000 employees are qualified scientists and engineers, who work with an annual research budget of 3 billion euros. Of this sum, 2.5 billion euros is generated through contract research. Our global footprint is very strong, with offices and research centres in the USA, Europe and Asia. Some of our renowned innovations are the MP3 software, white LED's and the smallest of cameras.

Fraunhofer has been a long-time trusted innovation partner in India, collaborating with some of the major players in the field of Material Science, Energy, Environment, Automotive, Electro-mobility, Production Technology and Smart Cities, working with Industry, Government and Public Sector.

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