

## “Clean water for a healthy world” – Drinking water treatment with UV emitters from Heraeus Noblelight

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World Water Day on 22 March – New Challenges for Drinking Water Treatment

- Sustainable Maintenance of Water Quality with Advanced Oxidation
- UV Purification 100 years Ago and Today.

“Clean water for a healthy world” – the theme of the World Water Day, a UN campaign, which takes place annually on 22 March, is dedicated this year to the quality of water. In order that water is suitable for drinking, cooking and washing, it must be able to satisfy high quality specifications in terms of chemical content and microbiological constitution. It must be free from pathogens and chemical substances which could cause illnesses. That this should not be taken for granted is demonstrated by the fact that in America it has been shown that in more than 46 million households there are residuals of medications and pollutants in drinking water.

Drinking water treatment involving water disinfection using energy-intensive ultraviolet radiation is already a well established and environmentally friendly technique. The treatment of drinking water with UV radiation is a very effective physical process for reliably disinfecting water. The energy-rich light of a wavelength of 254 nanometers destroys the genetic make-up and, in seconds, destroys the cells of the pathogens present in the water. Ultraviolet light is particularly effective on parasites which are chlorine-resistant. As the purification takes place without chemicals and there are no chemical residuals the quality of the drinking water is not impaired in terms of taste or smell. However, increasingly residuals of medications, hormones, pesticides and weed killers are affecting clean drinking water and present new challenges for drinking water treatment. It is necessary to destroy and render harmless complex pharmaceutical molecules such as steroids and antibiotics, as well as pollutants.

### Water Treatment with “Advanced Oxidation”

With the “Advanced Oxidation” process ultraviolet radiation can break down pollutants in the water. As distinguished from water disinfection, additionally in Advanced Oxidation UV radiation below 250 nanometers is used. The properties of this still energy-rich UV light are used in water purification are used to destroy substances in the water which are biologically difficult or impossible to break down. Chemical compounds are decomposed or more precisely converted and thus destroyed and made ineffective. The Advanced Oxidation process is carried out with UV radiation and a combination of ozone or alternatively hydrogen peroxide or both.

The subject of pollutant content in drinking water is still in its early days. There are no clear legal guideline limits for pollutant content in water. It is a challenge to achieve good water quality. Nevertheless, the water treatment process using

Advanced Oxidation is already being carried here and there. For example, the largest and most modern waterworks in the Netherlands PWN in Andijk, no longer uses just UV equipment for the disinfection of drinking water but has also introduced additional processes using Advanced Oxidation to destroy pollutants in water. Around 25 million cubic meters of dirty water were treated here a year. Since 1953, the waterworks in the IJsselmeer has supplied around 1 million people in the immediate area up to 100km away with clean water.

#### 100 Years of UV Treatment

The history of UV purification already goes back 100 years. The first patented purification with UV light took place in France in 1910 using quartz glass lamps – a development going back to the work of Richard Kuech (1860-1915) in 1904. In 100 years much has changed. “Today’s requirements and challenges for UV lamps focus on significantly increasing efficiency and operating life,” states Dr Sven Schalk, business leader for UV Process Technology at Heraeus Noblelight. Heraeus Noblelight, a manufacturer of special light sources, has developed innovative high power amalgam lamps for potable water treatment, which can be operated for up to 16,000 hours at virtually constant UV output. Thanks to their unique Longlife coating, they carry on working for twice as long as conventional standard low pressure lamps. This special coating is applied to the inside of the quartz glass sheathing of the lamp and, as a result, the aging process of the lamp is significantly improved. “With the new coating we have successfully eliminated the transmission loss of the quartz glass which affects conventional UV lamps and so achieved a virtually constant disinfection action over the complete lamp life,” says, Schalk in explaining the lamp development.

A long operating life and greater UV output are of great benefit to system builders. For example, they need fewer lamps in the design of disinfection plants and this offers significant potential savings in terms of lamp costs, obviously, as well as savings in energy and maintenance. Water treatment processes and systems using UV technology are not only environmentally-friendly but also open up future prospects to ensure the sustainability of drinking water quality.

UV light is versatile – it can be used to treat air, water or surfaces. Drinking water treatment in waterworks, waste water treatment in clarification plants, process water treatment in industry (such as the recycling and re-use of process water) or the treatment of ballast water in ships are just some of the environmentally friendly applications of UV technology in the water industry.

Heraeus Noblelight GmbH with its headquarters in Hanau and with subsidiaries in the USA, Great Britain, France, China, Australia and Puerto Rico, is one of the technology and market leaders in the production of specialty light sources. In 2008, Heraeus Noblelight had an annual turnover of 92.5 Million € and employed 735 people worldwide. The organisation develops, manufactures and markets infrared and ultraviolet emitters for applications in industrial manufacture, environmental protection, medicine and cosmetics, research, development and analytical laboratories.

Heraeus, the precious metals and technology group headquartered in Hanau, Germany, is a global, private company with over 155 years of tradition. Our businesses include precious metals, sensors, dental products, biomaterials, quartz glass, and specialty lighting sources. With product revenues approaching € 3 billion and precious metal trading revenues of € 13 billion, as well as over 13,000 employees in more than 110 companies worldwide, Heraeus holds a leading position in its global markets.

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