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POWER MODULATOR FOR HIGH-YIELD PRODUCTION OF PLASMA ACTIVATED WATER

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Water can be activated by applying plasma in contact with the water. Plasma activated water (PAW) typically contains hydrogen peroxide, nitrates, nitrites, and peroxyxynitrite, and typically has a pH ranging from 2-4. The components of PAW and the low pH have proven synergistic antimicrobial effects against bacteria, biofilms, yeasts and other microorganisms.

In this contribution, we describe a system for the production of PAW at high yield and high production rate. A compact and solid-state dual resonant system has been realized and successfully demonstrated for industrial PAW production. The system generates up to 80 kV dual-resonant high-voltage pulses with an oscillation frequency of 1 MHz, pulse rep-rate up to 20 kHz and an average power of 300 W. The paper describes a detailed comparison of various topologies, a detailed design procedure, simulations and overview of the practical realization and verification of the power modulator. The system is able to activate around 100 L/hour.

In addition, we will give an overview of several pilot demonstrations of promising applications of PAW. In agro applications, such as nitrogen fixation for fertilizer production, and the prevention of plant disinfections in horticulture.

Author: Prof. PEMEN, Guus (Eindhoven University of Technology)

Co-authors: Dr HOEBEN, Wilfred; HUISKAMP, Tom; LEENDERS, Paul; OOIJ, Polo van

Presenter: Prof. PEMEN, Guus (Eindhoven University of Technology)

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