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NON-THERMAL PLASMA T-SHAPED REACTOR FOR ACTIVATED WATER PRODUCTION

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Abstract

Non-thermal plasma is an innovative, eco-friendly technology, being considered as an emerging technology in many research fields. This work presents an analysis of the influence of different parameters on the energy efficiency of a T–shaped non-thermal plasma reactor for plasma activated water generation. The tests were performed on four distinct designs (T1, T2, T3, T4) of this type of reactor for which the following input parameters were varied: frequency (60, 150 and 250 Hz), water flows (5, 10, 15 and 20 mL/min) and gas flows (1 and 2 L/min Ar). It has been shown that the configurations T3 and T4, whose discharge is generated between the gas inlet and outlet electrode, are less efficient compared to designs T1 and T2, where the discharge is generated between the water inlet electrode and the outlet electrode. It was also considered the influence of the polarity of the pulse power supply where the reverse polarity (T2 design) records significant values at the gas flow of 1 L/min. The carrier gas was argon, which has been chosen in order to avoid radical quenching reactions by other molecular species, such as nitrates and nitrites, generated in the atmospheric air plasma.

Key words: energy efficiency, hydrogen peroxide, non-thermal plasma, plasma-activated water

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