

Investigating the optimized physical and electrical operating condition of DC-derived pulsed spark discharge over water surface generated by different input parameters

Talie Zarei¹, Mahmood Ghoranneviss¹, Davoud Dorrnian¹

¹Bio. Med. Lab., Plasma Physics Research Center, Science and Research Branch, Islamic Azad University, Tehran, Iran

Abstract

The work deals with the repetitively pulsed spark discharges over the water surface by studying both the electrical and the spectroscopic aspects. Detailed discharge electrical parameters, vibrational and rotational temperatures and electron density measurements for 9 different conditions of input frequencies and voltages over the water surface have been reported. The objective of this paper was to find effective operating conditions and compile results for the future industrial applications. The spectroscopic characterizations such as temperatures and densities were gathered from the optical emission spectroscopy (OES). The N₂ (C-B) Second Positive System (SPS) transition (370–382 nm) and the O triplet line (777 nm) obtained from plasma spectrum were analyzed by SpecAir software in order to get the vibrational/rotational temperatures and electron densities respectively. The results of this work are concurred with our previous work on softening hard water using pulsed spark discharge, finding the most effective conditions practically.