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(G*) (POS-68) Pulsed spark discharges in deionized water: influence of the magnetic field

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Electrical discharges in dielectric liquids are considered as an efficient technique for nanoparticle synthesis and machining via controlled erosion of the electrodes. Recently, magnetic field assisted method has shown great potential for enhancing the plasma-electrode interactions. Investigating the influence of the magnetic field, intensity and orientation, on the behavior of spark discharges are needed to understand the interactions, with the aim to improve the processes. In this study, spark discharges are produced in pin-to-plate configuration using a nanosecond pulsed power supply in deionized water. The magnetic field is generated with permanent magnet NdFeB. A statistical study of the electrical characteristics (voltage, current) of discharges with and without magnetic field was conducted with W and Ni electrodes and with various inter-electrode distances. The data is processed to report the evolution of some characteristics of the discharges, such as breakdown voltage, current peak, discharge delay, injected charge. Also, the pin erosion rate and the distribution of the impacts on the plate electrode are determined.

Primary author: GÉRAUD, Korentin

Co-authors: HAMDAN, Ahmad; Prof. VALENSI, Flavien (Université Toulouse III - Paul Sabatier)

Presenter: GÉRAUD, Korentin

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