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Time-resolved imaging of pulsed positive nanosecond discharge on water surface[1] AHMAD HAMDAN, JAMES DIAMOND, Universite de Montreal, GROUPE DE PHYSIQUE DES PLASMAS TEAM — Pulsed nanosecond discharges produce non-thermal plasmas that are highly promising for various applications as well as for fundamental investigations. The dynamics of such discharges are highly dependent on the experimental conditions, mainly the propagation medium. In this study, pulsed nanosecond discharges in air in-contact with water are investigated. The dynamics of the plasma emission has been unveiled using imaging technique with time resolution as short as 1 ns. Depending on the magnitude of the voltage, two discharges modes were observed: i) highly organized filaments and ii) intense and less organized plasma filaments. 1-ns resolved images showed that the highly organized filaments can be considered as plasma bullets that propagate at the water surface with a velocity of hundreds of m/s. Detailed analysis of the bullets number and of the discharge electrical characteristics of the discharge, have revealed that one bullet has a constant charge (few nC) independently of the discharges conditions. Such characteristic encouraged us to propose the plasma bullet as plasma quanta.

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