

Reactive species stability in plasma-activated water generated by different atmospheric pressure plasmas



Introduction: Because of their unique components, particularly reactive oxygen and nitrogen species (RONS), non-thermal plasma and plasma-activated water (PAW) are used in a wide range of applications. PAW is mostly used in food safety [1] and biomedical applications [2], agriculture and, surface treatment [3]. In this work, three distinct plasma setups—Transient Spark (TS) batch water treatment, Transient Spark-Electrospray (TS-ES), and Fountain Dielectric Barrier Discharge (FDBD)—are employed

To generate PAW using both tap and deionized (DI) water. TS and TS-ES use DC high voltage and operate in pin-to-plane geometries. For each, the spark pulse frequency and gap distance are set at 1 kHz and 1 cm, respectively. For TS-ES, a flow rate of 0.5 ml/min was established, while batch TS treated 10 ml for 10 minutes. We utilized a neon-sign AC high voltage power source with 15 kV pk-to-pk and 20 kHz for FDBD, and we cycled 1 L of water for 20 minutes.

Plasma Set-ups

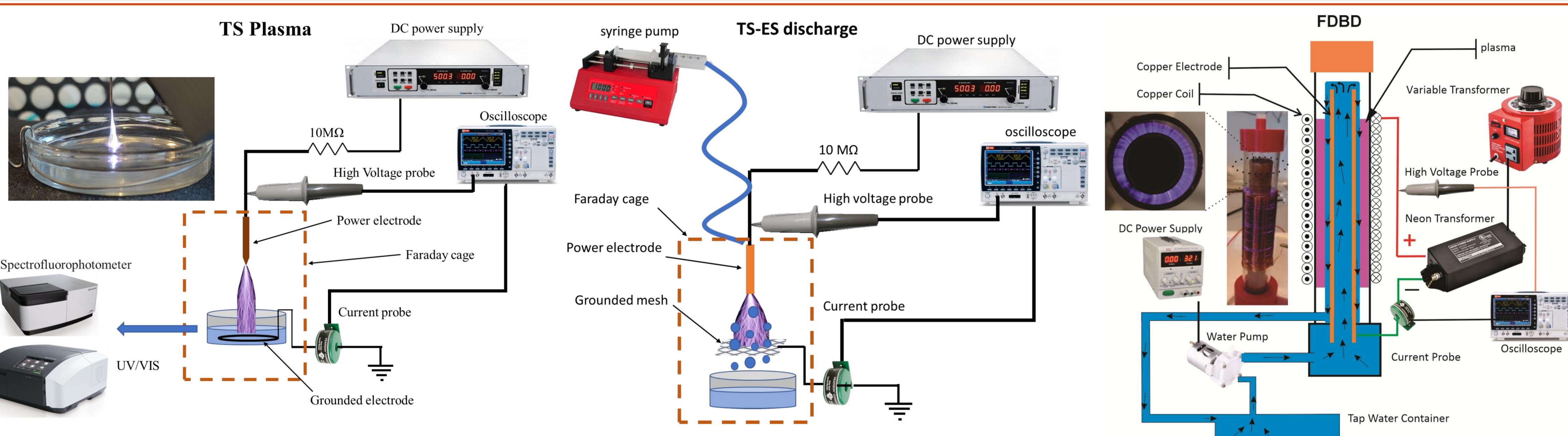
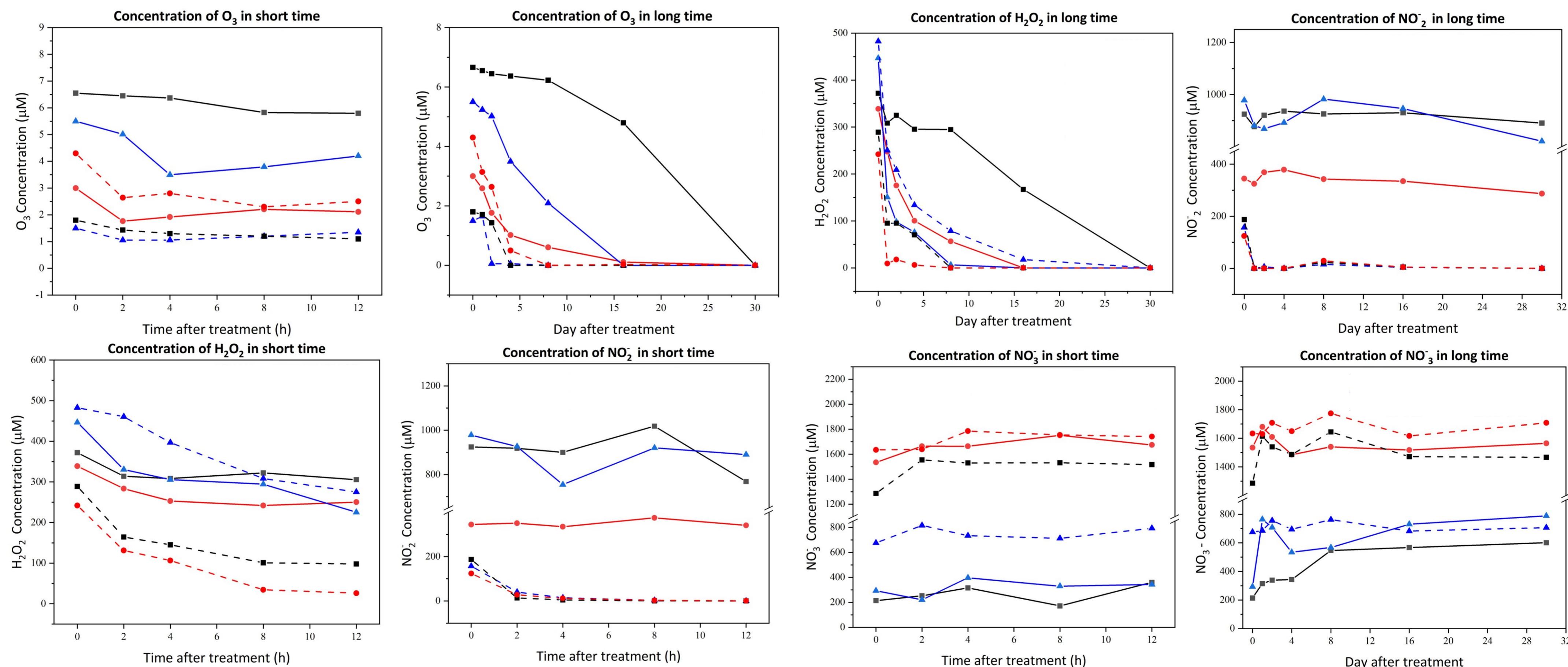


Figure 1. Schematic diagram of the PAW production by (A) transient spark (TS) with UV-A/UV-C irradiation, (B) transient spark electro spray (TS-ES), (C) fountain dielectric barrier discharge (FDBD)

Result



References

- [1] Machala Z. et al. *Plasma Process. Polym.*, 10, 649–659 (2013)
- [2] Pavlovich M. J. et al. *Plasma Process. Polym.* 10, 1051–1060 (2013)
- [3] Mehrabifard R. et al. "Combined Antimicrobial Properties of Ultraviolet Radiation and Plasma-Activated Water," (2024), doi: 10.2139/SSRN.4961388.

Acknowledgment

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