PLASMA WATER TREATMENT BY A DIRECT PIEZO DISCHARGE AND ITS DIAGNOSIS BY ABSORPTION IN THE UV RANGE [[1]](#footnote-1)\*)

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The production of long-lived reactive oxygen and nitrogen species in distilled water treated with low-temperature plasma of a direct (without a dielectric barrier) piezo-discharge [1] was studied. Long-lived reactive species include nitrate and nitrite ions (NO3−, NO2−), hydrogen peroxide (H2O2), and nitrous acid (HONO). The use of plasma treated water is widely researched in biomedical applications, agriculture and food industry [2].

The method for diagnosing reactive species presented in the work is based on the absorption of photons in the range of 200–400 nm by them [3]. The absorption ranges of these species intersect, but the absorption spectra differ qualitatively from each other (see figure). This makes it possible to decompose the total absorption spectrum into components - the absorption spectra of each of the particles. This diagnostic method is non-invasive and allows you to simultaneously determine the concentration of reactive species.

A direct piezo discharge was generated in the air at atmospheric pressure above the water surface. Water treatment with a volume of 10 ml was carried out in a rectangular cuvette (2×5 cm) with quartz CU walls. A beam of diagnostic UV radiation passed through the cell along its larger side. The water treatment time was 8 minutes. During this time, it produced 240 μM NO3−, 200 μM NO2−, 140 μM HONO and 350...450 μM H2O2. Production of hydrogen peroxide depended on the humidity of the air.

In this work, we obtained data on the time dynamics of the concentrations of NO3−, NO2−, H2O2, and HONO particles both during discharge treatment and for 3 days after it.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Pt/ru/HM-Artem%27ev.docx) [↑](#footnote-ref-1)