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STUDENT AWARD FINALIST: Plasma Acid: A Chemically and Physically Metastable Substance NATALIE SHAINSKY, DANIL DOBRYNIN, UTKU ERCAN, SURESH JOSHI, ARI BROOKS, HAIFENG JI, GREGORY FRIDMAN, YOUNG CHO, ALEXANDER FRIDMAN, GENNADY FRIEDMAN, Drexel University — Non-thermal atmospheric pressure dielectric barrier discharge applied to the surface of a liquid creates a chemically and physically metastable substance. The properties and lifetime of the substance depend on the treatment conditions such as gas atmosphere and liquid medium used, treatment dose, and other parameters. When deionized water is used, the metastable substance becomes a strong oxidizer. We show that direct exposure of deionized water to neutral and charged species produced in plasma creates a strong oxidizer and acidic substance in this water which, for the lack of a better term, we termed *plasma acid*. Plasma acid can remain stable for relatively long time and its oxidizing power may be linked to the significant lowering of its pH. We report experiments that demonstrate plasma acid's metastability. We also show that observed pH of as low as 2.0 cannot be completely accounted for by the production of nitric acid; and that the conjugate base derived from superoxide is at least partly responsible for both, lowering of the pH and increase in the oxidizing power of the solution.

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