
Waste-water treatment using nanosecond discharge plasma

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Recently, an advanced oxidation process (AOP), which use hydroxyl radicals(OH) for a decomposition of harmful molecules in water, has widely researched in variety industrial fields. Generally, AOP technology has employed combinations of ozone (O₃), ultra violet (UV) and hydrogen peroxide (H₂O₂). The technology produces OH by the reaction between O₃, UV and H₂O₂. Presently, some non-thermal plasmas, generated by corona discharge, dielectric barrier discharge or pulsed streamer discharge, have been utilized for wastewater treatment as one of AOPs. The electrical discharge can form OH directly during the process. Therefore, non-thermal plasma make efficient AOP than general one.

In decade, nanosecond pulsed power having 5 ns duration developed and has delivered the energy efficient discharge plasma process including O₃ production, harmful gas decomposition, waste water treatment and so on. In the presentation, the characteristics of waste water treatment using the nanosecond pulsed discharge plasma would be introduced. The treatment system simply consisted of the nanosecond pulsed discharge reactor and the shower facility. In the system, waste water is naively dropped as with rain into the discharge reactor and the harmful molecules in waste water reacts with O, OH and O₃ formed by nanosecond pulsed discharge. The total organic carbon (TOC) of the passed waste water in the discharge reactor decreased effectively. The merits of the nanosecond pulsed power for waste water treatment are deduced as the below.

@stable discharge for the higher conductivity waste water

@lower heat loss

@energy efficient OH formation