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Treatment of Aqueous Pollutant by a Discharge Plasma Reactor Using a Porous Membrane

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Over the past ten years, a number of studies using the discharge plasma, such as the surface discharge over water, the discharge assisted by bubbling and so on, have performed for the treatment of contaminated water. The aim of these researches is focused on the improvement of the energy efficiency. The input energy supplied into the discharge is used preferentially to produce discharge plasma in atmosphere gas. From the viewpoint of the energy consumption, it is apparent that plasma production in gas phase is superior to that in liquid phase. We considered the water treatment process by a pulse discharge plasma reactor of coaxial cylinder using a porous membrane in order to reduce energy consumption. It is important for this method to confirm the dependence of the controllable parameter of pulsed-power generator in order to realize higher energy efficiency. The pulsed-power generator developed in our laboratory is composed of a high-voltage direct-current power supply and a MPC (Magnetic Pulse Compression) circuit with the embedded system control. Each pulse discharge voltage and frequency can control by not only changing the input DC high voltage but also the rewriting of the embedded system of the MPC circuit. Thus, the pulse power generator can control the injection energy per unit time, and the injection energy per pulse of one shot. In this study, in order to confirm the advantage of this plasma reactor, we report the energy dependence of the phenol decomposition efficiency, and the effect of selection of active species, by changing both of input energy and atmospheric gas which is poured in into a reactor.

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