# INFLUENCE OF ELECTRICAL CONDUCTIVITY AND PH ON HYDROGEN PRODUCTION USING PULSED DISCHARGE OVER THE WATER SURFACE

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Hydrogen has attracted significant attention from the hydrogen energy community. Existing hydrogen production methods, such as the reforming of fossil fuels and water electrolysis, have several problems. Reforming of fossil fuels emits carbon dioxide in production processes and water electrolysis needs water of a high degree of purity. Hydrogen production methods using plasma electrolysis have been reported [1], [2]. Here, we report on the development of a direct hydrogen production method from water through the use of nanosecond pulsed discharges. Nanosecond pulsed discharges are expected to create a novel chemical and physical reaction processes due to the high energy electrons and ions, high electric fields, ultraviolet light and shock waves present in the discharge. In this paper, the influence of electrical conductivity and water pH on hydrogen production processes using nanosecond pulsed discharges over the water surface are investigated. Nanosecond pulsed voltages were formed by a magnetic pulse compression circuit and were applied to a multi-needle electrode fixed 5 mm above the water. The electrical conductivity of water was varied from 5 uS/cm to 100 mS/cm. The hydrogen produced by the pulsed discharges was quantitatively measured by a gas chromatograph with a thermal conductive detector (SHIMADZU, GC-8A). The hydrogen production rate was found to increase with electrical conductivity. The value of the voltage and current through the plasma varied with electrical conductivity and water pH. These results suggest that the electrical conductivity and pH of the water may influence the hydrogen production process.

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2. N. Monk and S. Watson, “Review of pulsed power for efficient hydrogen production”, International Journal of Hydrogen Energy, pp. 1-10, 2016.

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