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3P44 - Erosion characteristics for different geometric electrodes in an AC rotating arc reactor

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In a gliding arc reactor, the arc string moves two dimensionally. On the other hand, in a rotating arc reactor the arc string moves three dimensionally by using a swirl motion of arc gas. The performance of most plasma generators using electric arcs is determined by the design of electrodes. Especially, the design of high voltage electrode is a dominant factor in determining the limitations in reactor operating current and power level as well as lifetime between maintenance (1). Design approach for the development of plasma reactor with long lifetime by less erosion of electrode has been carried out. Plasma reactor is based on the "rotating arc" design and different geometries of high voltage electrodes in an AC arc reactor, 3 types, were compared. Experiments were carried out with varying applied power at the same flow rate of discharge gas and arc length. Temporal change in voltage-current values is monitored, and electrode weight loss and erosion shape are compared after operation. In addition, a 3D scanning method is utilized to quantitatively evaluate the erosion rate of the electrodes depending on their shapes.

1. JOACHIM HESERLEIN, 1999, "Electrode Phenomena in Plasma Torches", ANNALS of THE NEW YORK ACADEMY OF SCIENCES: Heat and mass transfer under plasma conditions, Vol. 891, pp. 14-27.

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