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Development of magnetically well-type plasma torch for high-temperature process

The 30 kW DC plasma torch system with the well-type cathode (WTC) has been developed to generate thermal plasma above 1200 °C, which is adding the external magnetic coil on the cathodic part of the torch. The well-type torch is hollow cylindrical copper's 5 mm thickness, whose cathode electrode and anode electrode was 150 mm in each length, the diameter is 22 mm through the center, The gap between both electrodes is 1.5 mm isolated with a swirl gas ring. Under the experimental conditions at 0.5 - 0.8 MPa compressed air is applied to both sides of the torch, the airflow rate is 60 L/min and 120 L/min from the sides, and above, as followed. the thermal plasma has been generated, their maximum current is 200 A and 160 V, the length is about 30 cm, its diameter about 3 to 5 cm wide, recognized UV emission has been present. In this work, the 500 G of the magnetic field produced by an external solenoid has been developed, to drive the arc root and reduce the cathode erosion damage. The result shows the necessity of a magnetic field, a rotational arc root inside the cathode surface, and electrode life hours are compared with the case of un magnetic field-driven has been present. Finally, the knowledge of this work to extend electrode life and applied to the system to be suitable for the disposal of infectious wastes.

Primary author: Mr TALEH, Ridhvee

Co-author: Dr NISOA, Mudtorleb

Presenter: Mr TALEH, Ridhvee

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