

# Application of gas chromatography to cold plasma jet analysis

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The prototype of a multipurpose microwave (2.45 GHz) plasmatron previously developed and manufactured for plasma surface modification makes it possible to generate atmospheric-pressure cold plasma jets by means of external portable plasma torch with a wide outlet of 2.5 cm in diameter and a microwave power of the order of several hundred watts. A microwave discharge is initiated when a plasma-forming gas flows through the torch. Discharge channels are formed between the rod electrodes and the inner wall of the cylindrical discharge chamber near the outlet of the torch. We have implemented a procedure for chromatographic analysis of the gas composition in microwave discharge zone inside the plasma torch and in a cold plasma jet that forms behind the outlet of the torch while interacting with atmospheric air. For the analysis of gaseous samples the chromatographic gas complex "Chromos GKk-1000" was used. Argon (99.993%) was supplied to the torch at a flow rate of 7.5 liters per minute. The analysis of gas samples showed that new gaseous products (hydrogen and methane) are formed and the concentration of  $CO$  increases 5-6 times due to plasma-gas interaction. This effect is connected with increased mixing of atmospheric air containing water vapor to the argon flow in the discharge zone. The formation of carbon monoxide and hydrogen occurs in the processes of dissociation of  $CO_2$  and the processes of direct decomposition of water vapor in a nonequilibrium plasma through vibrationally excited states.

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