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Carbon dioxide reduction in low-pressure ICP STANISLAV DUDIN, ALEXANDER DAKHOV, V.N. Karazin Kharkiv National University — This work experimentally investigates the efficiency of carbon dioxide dissociation in inductively coupled plasma (ICP) at low gas pressure. The plasma source operates at 13.56 MHz in the RF power range of 100-500 W. Pure CO_2 is fed into the plasma while the output gas composition is measured by a mass spectrometer. The pressure range inside the source was changed in the range of 1-200 mTorr. Excitation processes in the plasma are studied by means of optical emission spectroscopy, and the plasma density along with the electron temperature are monitored using a Langmuir probe. Experimental results have shown that the conversion efficiency of CO_2 to CO and O_2 increases with the RF and reaches the values more than 50%. A theoretical treatment of the dissociation pathway is also given allowing estimation of the mean dissociation length of the carbon dioxide molecule in plasma. The plasma parameters necessary for efficient CO_2 reduction are discussed.

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