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REFERENCE: Short Term Scientific Mission, COST P9
Beneficiary: Juraj Orszagh, Dept of Experimental Physics
Comenius University
Host: Nigel Mason, Dept of Physics and Astronomy
The Open University
Period: from 4/04/2005 to 29/04/2005 Place: Milton Keynes (UK)
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SCIENTIFIC REPORT

PURPOSE OF VISIT

The visit was the continuation of collaboration between Department of Experimental Physics, Comenius University and Department of Physics and Astronomy, Open University. Its purpose was the upgrading experimental apparatus built earlier followed by investigation of influence of water vapours in carbon dioxide to negative and positive corona discharge. It is not known how water vapours influence the parameters of the discharge and ozone production.

DESCRIPTION OF THE WORK CARRIED OUT DURING THE VISIT

During the visit existing apparatus, which was built earlier for investigation of corona discharge and ozone produced in discharge, has been rebuilt and upgraded. The older high voltage power supply was changed for new one which is able to provide higher output. Discharge current and voltage measurement was upgraded. Now it is possible to save current and voltage data directly to computer. It is great improvement in comparison with system of current measurement used before. System of flow controllers was added to the apparatus. It allows performing all the measurements in flowing regime when the gas mixture flows through the discharge tube at constant flow rate. The part of the apparatus which allows adding definite amount of water vapours to the gas was prepared in Bratislava at Department of experimental physics and brought to Open University. It was installed into the thermostat because the temperature of water has to be regulated. New hygrometer was integrated into the experimental apparatus to measure the amount of water in the gas mixture accurately.

The experiment was composed of measurements in static regime and flowing regime for both positive and negative corona discharge. The discharge tube was installed directly in the UV spectrometer, so it was possible to measure ozone concentration directly in the volume of the tube. Various amounts of water vapours were added to carbon dioxide to investigate the influence of water. In static regime the negative corona discharge was switched on for 1 hour in closed discharge tube. During this period the discharge current and ozone concentration in the tube were observed. Then the ozone decomposition was observed during next hour. This was repeated for various voltages and amounts of water. Ozone concentration and discharge current were measured in flowing regime also. Various voltages were set and then the data were measured and saved. Similar experiments were done in positive corona discharge.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

- Presence of water in the gas used to feed corona discharge influences ozone production and discharge current significantly.
- This research will continue at Comenius University, Bratislava to obtain more results for understanding the elementary processes active in the discharge.

FUTURE COLLABORATION WITH HOST INSTITUTIONS

The experiment will partly continue at Comenius University in Bratislava. Products of the discharge will be analyzed by infrared spectrometry. In October 2005 next visit of Open University is planned to perform more experimental measurements to obtain more results on this topic.

PROJECTED PUBLICATIONS/ARTICLES RESULTING OR TO RESULT FROM THE STSM

The publication of results is being prepared.

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