

Short Visit Grant 1324 – Scientific Report

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The purpose of the visit was to repeat several measurements in pure carbon dioxide and pure oxygen to ensure the reproducibility is good enough and according to the results decide what will be the next steps in the experiment.

The needed measurements were successfully repeated and the results are satisfying (comparable with the previous). The apparatus has been prepared for major changes in the near future. The new discharge reactor is being designed. It will eliminate the major problems of the one used up to now. The temperature of the walls and gas will be measured and the reactor temperature will be stabilised to ensure same temperature conditions during the experiment. It is crucial because of significant ozone decomposition rate dependence on the temperature.

Apart from these planned experiments several other measurements in both static and flowing regime were performed. The set of flow-stopped regime measurements in various mixtures of carbon dioxide and oxygen were completed. These were then repeated for both positive and negative corona discharge. Interesting dependence of ozone concentration on portion of oxygen in the gas mixture was found. The first results of these experiments are going to be published at international scientific conferences in Belgium

and Japan. Then the results of these experiments will be supplemented with the previous results and published in scientific journal.

Another set of measurements were completed in flowing oxygen with added water vapours and also carbon dioxide with added water vapours. They were done for both polarities of the discharge. The effect of high concentrations of water vapours (up to 20000 ppm) in carbon dioxide and in oxygen on the ozone production was studied thoroughly. These measurements have revealed another weakness of the old discharge reactor. As such large amounts of water were added into the gasses it remained adsorbed on the inner reactor walls and it was serious problem to dry the system. This problem will be solved in the next generation of reactor by possibility to heat and evacuate the reactor to remove the remaining water from the inner surfaces effectively.

The collaboration on this project will continue in the summer and also in the autumn 2007 when the new reactor will be installed and effects of temperature and pressure will be studied. The infrared spectroscopy analysis methods will be involved in our experiments also.