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REFERENCE: Short Term Scientific Mission, COST P9  
Beneficiary: Jan SKALNY, Comenius University Bratislava  
Host: Paulo Limao-Vieira, Universidade Nova de Lisboa, Caparica, Portugal  
Period: from 21/04/2004 to 26/04/2004 Place: Lisboa-Caparica  
Reference code: COST-STSM-P9-00206

## **SCIENTIFIC REPORT**

### ***PURPOSE OF VISIT***

This visit was to establish a collaboration between of two laboratories Plasma Department, Comenius University, Bratislava and the Departamento de Fisica Universidade Nova de Lisboa. The purpose of the visit was to perform the analysis of results of mass spectrometric studies products formed in negative corona discharge fed by mixtures of CO<sub>2</sub> + H<sub>2</sub>O. The studies are looking for explanation of the role of water in ozone formation, which is important factor for formation of elementary biomolecules in Martian atmosphere and plays an important role in destruction of micro-organisms in biological material exposed in discharge plasmas. The second goal of the visit was to participate on preparation of the experimental apparatus for the study of the damages of biomolecules initiated by the charge transfer between of molecules relevant to bioprocesses.

### ***DESCRIPTION OF THE WORK CARRIED OUT DURING THE VISIT***

During my visit I was acquainted with the undergoing research activities of several laboratories of Departamento de Fisica Universidade Nova de Lisboa. I discussed with researchers involved in the investigations of collisional processes occurring in plasma of different types as well of. some current applications of discharge plasma. We have consulted with Paulo Limao-Vieira experimental material obtained in Bratislava, namely the results of studies of ozone production in pure CO<sub>2</sub>. The preliminary analysis was performed and is continued currently. The results will be completed and published in a near future. Moreover I have consulted construction of apparatus for the experimental study of the damages of biomolecules initiated by the charge transfer between of molecules relevant to bioprocesses. We have discussed the technical problems of ion sources based on kalium ions as well as swe have selected appropriate molecules for experimental studies.

During my visit I presented a lecture on results obtained in my earlier experimental research. Title of given seminar was: "Mass spectrometric analysis of ions extracted from negative corona discharge". After the seminar a discussion took place conducted by dr. Paulo Limao-Vieira.

During the further discussions, the possibilities of future collaboration in electron interactions with biomolecular systems were explored. The temperature dependences of interactions with specific biomolecules such as alanine, valine, and others were selected as a

target of coordinated studies. Some complementary measurements can be performed both in Bratislava and Lisbon. Hence the complex results can be obtained.

### ***DESCRIPTION OF THE MAIN RESULTS OBTAINED***

- Researchers are acquainted with the current research activities in two laboratories:
- Research on electron interactions with biomolecules will be continued in coordinated manner biomolecules of interest are alanine and valine.
- Research on corona discharges will be continued in order to investigate molecular processes relevant for formation of biomolecules, as well as destruction some biomolecules in discharges.
- Some experimental results of ozone studies were analysed
- Construction of ion source for charge transfer studies on biomolecules was fixed.

### ***FUTURE COLLABORATION WITH HOST INSTITUTIONS***

The future collaboration with host institution is envisaged in the area of binary collisions of electrons with molecules and investigation of ion molecule reactions inducing the damages of biomolecules. Moreover the macroscopic effect of corona discharge on molecules relevant to biological process will be conducted too.

### ***PROJECTED PUBLICATIONS/ARTICLES RESULTING OR TO RESULT FROM THE STSM***

At this moment joint publications are not projected as this is the first contact between two laboratories. The results of corona studies in CO<sub>2</sub> and its mixtures are expected to be prepared for publication within this year.

Jan Skalny

Bratislava 15 May, 2004.

### ***CONFIRMATION BY THE HOST INSTITUTE OF THE SUCCESSFUL EXECUTION OF THE MISSION***

The visit of Prof. Jan Skalny was underdone with success and according the planed activities.

Dr. Paulo Limao-Vieira

Lisbon, 20 May, 2004.