Jan SKALNY

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REFERENCE: Short Term Scientific Mission, COST P9

Beneficiary: Jan SKALNY, Comenius University Bratislava

Host: Prof. Nigel J. Mason, Open Universitz UK

Period: from 22/10/2007 to 02/10/2007 Place: Milton Keynes UK

Reference code: COST-STSM-P9-2041

SCIENTIFIC REPORT

PURPOSE OF VISIT

The collaboration between the Plasma Physics Division at the Department of Experimental Physics of Comenius University Bratislava and the Department of Physics and Astronomy of the Open University in Milton Keynes is successfully active several years. The different scientific projects were accomplished in collaboration between two mentioned institutions (NATO, EPIC). The research was focused to the study of electron impact processes with various gaseous molecules at ambient and also at elevated gas temperatures by using the crossed electron-molecular beams apparatus as well as to studies of macroscopic properties of corona discharges and processes initiated by such

type of gaseous discharge at atmospherics and low pressures. Recently the new plasma chemical reactor based on the corona discharge was designed and manufactured in Bratislava and finally installed at Open University in Milton Keynes. The results obtained during collaboration have been presented at many conferences and more than five papers prepared in collaboration have been already published. Several of them were recently submitted to various journals. The apparatus is using in vitro UV spectrometry

The recently developed apparatus installed at Open University is a simple reactor, which enabled us to use the absorption spectrometry for analysis of some compounds produced by corona discharge. The current conception is, however, not appropriate for systematic studies of all interactions produced in corona discharges with such chemical compounds. There is a need to make some changes and adopt the reactor for IR spectrometry.

The aim of the stay was to finalise the analysis and to prepare two papers summarising the results of experiments performed during the stay in company Hiden where mass spectrometric measurements were performed in June 2007. The consultations with Prof. Mason and members of his science group were necessary for performing of outlined plan. Secondary aim was to complete information required for reconstruction of apparatus enabling us to conduct experiments in which IR spectrometry will be use for studies of electron stimulated chemical processes in plasma.The redesigned apparatus will be used in collaboration with students from Open University and Comenius University. One reactor will be installed in future in Bratislava, where the FTIR diagnostics technique is available.

DESCRIPTION OF THE WORK CARRIED OUT DURING THE VISIT

The plan of activities has been fullfiled. During the stay I have finished the text of two papers, which were during the stay submitted to editors. Moreover the results of mass spectrometric studies performed in CO_2 and O_2 has been analysed. The old reactor was tested in dry and wet carbon dioxide and oxygen. The drawings of new reactor and some parts of apparatus needed for performace of IR spectroscopy has been done.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

During STSM time the data necessary for construction of the new reactor were completed and raw drawing of individual parts were prepared. The reactor will enable us

the IR spectroscopy for the study of interactions of low energy electrons, negative and positive ions produced by discharges with some biomoleculeles including DNA. The reactor will be manufactured in workshop at Comenius University in Bratislava. Moreover the data measured carbon dioxide and molecular oxygen by mass spectrometry were summarised and analysed. These will be published soon. Finally two papers were submitted for publishing.

FUTURE COLLABORATION WITH HOST INSTITUTIONS

Collaboration will be lasted in next motht when students will continue the started experiments. Analysis of results will be performed in Bratislava. The construction plans of new reactor will be completed and reactor will be manufactured in near future in Bratislava. This will be used both in Bratislava and at Open Univeristy. The aim is to study bioactive molecules in gaseous discharges. Moreover the studies of spectra of ions in presence of biomolecules in corona discharges will be perform in collaboration with fy. Hidden. Some experiments will pay attention to depolution of gaseous exhalats by atmospheric electrical discharges.The new collaboration with researchers from Department of Genetics of Faculty of Natural Sciences Comenius University Bratislava is apalnned for analysis of the degradation od DNN induced by particles produced by corona discharges.

PROJECTED PUBLICATIONS/ARTICLES RESULTING OR TO RESULT FROM THE STSM

During the STSM two papers were finalised and submitted to journals:

1.

J. D. Skalny[a*], J. Orszagh[a], N. J. Mason[b], J. A. Rees[c], Y. Aranda-Gonzalvo[c] and T. D. Whitmore[c]

Mass spectrometric study of ions extracted from point to plane DC corona discharges in N_2O at atmospheric pressure.

Submmitted to: J. Phys D.: Appl. Phys.

2.

Jan D. Skalny[a*], Juraj Orszagh[a], Nigel J. Mason[b], J. Alan Rees[c], Yolanda Aranda-Gonzalvo[c] and Terry D. Whitmore[c]

Mass spectrometric study of negative ions extracted from point to plane negative corona discharge in ambient air at atmospheric pressure.

Submitted to: International Journal of Mass Spectrometry

Jan Skalny

Bratislava 2 November, 2007.

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

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

Prof. Nigel J. Mason

Milton Keynes, 2 November, 2007.