Publ. Astron. Obs. Belgrade No. 84 (2008), 341 - 342 *Contributed Paper*

POSITIVE CORONA DISCHARGE IN N_2+CH_4 MIXTURE AT ATMOSPHERIC PRESSURE

G. HORVÁTH[1,2], J. D. SKALNÝ[1,2], N. J. MASON[2], M. ZAHORAN[1], J. ORSZÁGH[1,2]

[1] *Comenius University, FMFI Mlynska dolina F2, 84248 Bratislava, Slovakia*

[2] *Open University, Department of Physics and Astronomy, Milton Keynes, United Kingdom*

Abstract. Titan is considered as one of the few places in Solar system, where atmospheric and surface conditions could have produced organic molecules as precursors of higher hydrocarbons, nitriles or amino acids. Most of laboratory simulations of Titan's atmosphere were carried out at lower pressures presenting stratospheric conditions but there is poor knowledge about simulated reactions of Titan's troposphere. In our work an experimental investigation of products in positive coaxial corona discharge fed by mixture of N_2 and CH_4 with ratio of N_2:CH_4=98:2 in stationary regime has been made using UV spectroscopy. The measurements have been carried out at pressure of 1 bar and ambient temperature. The discharge reactor used for the treatment of the gas mixture consisted of a brass cylinder with diameter of 16 mm and length of 70 mm. A stainless steel and tungsten wires of diameter of 0.125 mm was centred inside the metal cylinder and was connected to the high voltage power supply. Coaxial corona discharge was generated by a Glassman high voltage power supply. The mixing ratio of methane and nitrogen was regulated by a MKS flow controllers. The reactor was placed in a Shimadzu VUV spectrometer for the in-situ measurements of absorbance of synthesized compounds. The measurements were focused on the UV analysis of time evolution of C_2H_2 and C_2H_4 concentrations and EMS study of deposited compounds on discharge electrodes (Figure 1). After a certain time a yellow- orange layer was formed on the active discharge electrode causing sparks and forming a dense rose-like spots on the covered electrode surface (Figure 2).

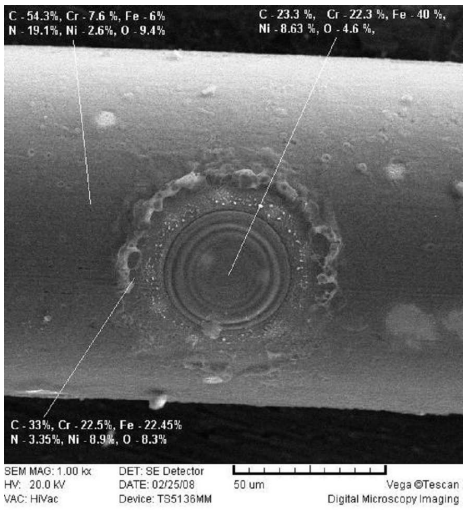

Figure 1: EMS study of electrode surface.

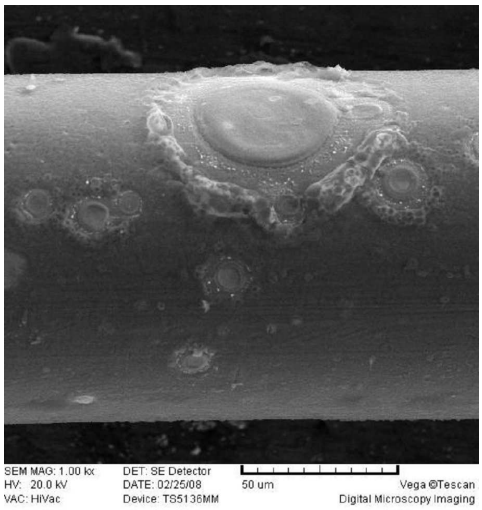

Figure 2: EMS picture of a treated electrode.

Acknowledgments

This research project was partially supported by Slovak Grant Agency VEGA1/1267/04, UK/400/2008, ESF projects COST CM0601 the UK Royal Society for a Joint International project and the Leverhulme Trust for a Visiting Professorship.