Title: **Creation of radicals in electric discharge supersonic plasma jet**

Author: Milan Mašát

Department: Department of Surface and Plasma Science

Supervisor: Prof. RNDr. Milan Tichý, DrSc.

Supervisor's e-mail address: Milan.Tichy@mff.cuni.cz

Abstract:

Free radicals are the key intermediates and propagators of chemical reactions in Earth's atmosphere. Study of their structure and chemical properties is vital for understanding the processes in atmosphere. But their high reactivity brings the need for specific research methods. In-situ preparation and non-invasive detection and characterization techniques are needed. Most commonly used laboratory techniques such as photodissociation or electric discharge generate radicals at temperatures that are significantly higher then those under atmospheric conditions, which we intend to model.

In this work, I was developing a source of cold radicals and experimental techniques for measuring their properties. I combined plasma source, which creates sufficient concentrations of radicals with supersonic expansion in which the translational and internal degrees of freedom are cooled deeply below the room temperature. For their characterization I used high-resolution spectroscopy utilizing near infrared laser diodes. I also developed and built electronic circuits and software for controlling the radical source, for detection of laser radiation and data acquisition. I measured electric properties of the discharge in the supersonic plasma jet, as well as the properties of model radicals and stable molecules in the supersonic expansion.

Keywords: spectroscopy, radicals, supersonic expansion, discharge jet

19.4.2007 10:46