

Title: Creation and characterization of cold molecules and molecular radicals in supersonic plasmatic nozzle

Author: Milan Mašát

Department: J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i. (32-UFCHAV)

Supervisor: Mgr. Ondřej Votava, Ph. D., J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i. (32-UFCHAV)

Abstract:

The aim of this work is the development and characterization of experimental apparatus designed for study of expansion-cooled stable and unstable molecule species in near infrared region, as well as associated methodology. This device consists of discharge source of cold molecular radicals and a system for their spectroscopic analysis. The source and the spectroscopic part changes and upgrades are described in detail. Characterization of radical source and its methodology was done on the  $\text{OH}^\bullet$  radical model. Changes in radical properties under different experimental conditions, such as stagnation pressure, used voltage and different geometries of both the nozzle and electrodes are measured. Methodology of spectroscopic analysis was carried out on methane molecule in unassigned part of spectra, so called icosad region.

Keywords: supersonic expansion, molecular radical source, high resolution spectroscopy