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FACULTY OF SCIENCE
DEPARTMENT OF INORGANIC CHEMISTRY

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Reviewer's report on Kateřina Osterrothová Ph.D. thesis "Application of Raman spectroscopy for the identification of organic inclusion in minerals for the field of exobiology"

Reviewed doctoral thesis is focused on laboratory investigation of feasibility of Raman spectroscopy to detect selected types of exobiological biomarkers. The topic of the thesis is very up-to-date especially in consequence of upcoming Mars missions where Raman spectrometer will be part of scientific equipment.

The main goal of presented doctoral thesis lies in the study of detection limits of several biomarkers (i.e. pigments, carboxylic acids and amino-acids) in mineral matrixes. The prepared model mixtures were further examined through transparent crystal plates and finally also as liquid inclusions.

The thesis is based on four original papers – three of them were already published in "Spectrochimica Acta A" and the fourth one was submitted to editor. This fact also acts as a proof of scientific significance of presented thesis. Reviewed thesis is very compact and readable using correct scientific language. Kateřina Osterrothová gives the introduction to astrobiology, comments the results presented in the papers and concludes with an outlook of future research.

I have following remarks and questions concerning the thesis:

1) The assignment of the observed Raman bands of L-alanine, which is presented in the fourth paper attached in appendix ("Investigation of biomolecules trapped in fluid inclusions..." – chapter 3.2) is not correct, especially in the 3700-2400 cm^{-1} region.

2) Presented detection limits of biomarkers in liquid inclusions must be considered only as a very rough estimation. The starting concentration of selected biomarkers has undoubtedly changed (probably increased) during performed crystallization. Another reason is the fact that the penetration depth of the laser beam into the inclusion, which is closely related to the quality of Raman signal, is influenced by many factors complicating quantification.

3) What is your opinion concerning detection of studied biomarkers in other common evaporites?

Finally, I can conclude that reviewed thesis of Kateřina Osterrothová fulfils standard of Ph.D. thesis and I can fully **recommend** it as a basis for Ph.D. defence.

Prague, 01. 08. 2011

Doc. RNDr. Ivan Němec, Ph.D.

A handwritten signature in black ink, appearing to read 'I. Němec', written in a cursive style.