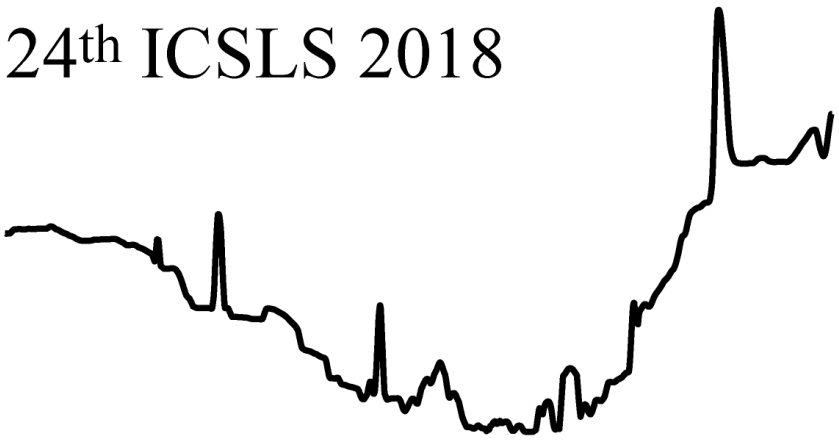
24th ICSLS 2018



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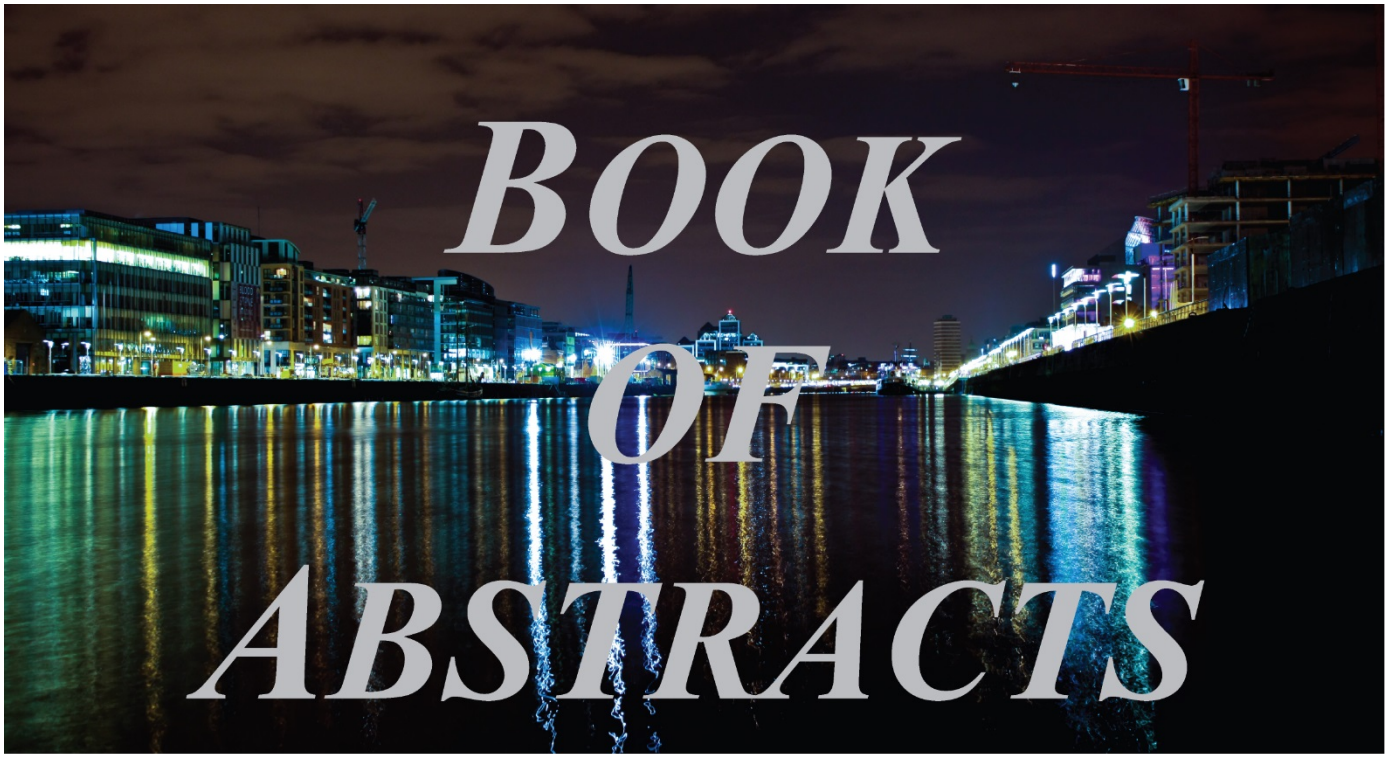

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Studies of Thallium Line Spectra in Thallium – Mercury Discharge

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In this work, thallium and mercury discharge is studied. In our precious work we have observed extraordinary broadening above Doppler broadening for some spectral lines of thallium, for example 351.9 nm line [1]. We supposed that the additional broadening could be due to energy transfer in collisions of mercury and thallium atoms.

In this paper, we present further study of broadening of thallium emission spectral line shapes in the Tl-Hg discharge. The spectral lines were emitted from high frequency electrodeless lamps (HFEDLs) containing Tl, Hg, Ar mixtures and measured by means of Fourier transform spectrometer. The deconvolution procedure, by means of ill posed inverse task solution [2] was performed to obtain the real (without instrumental function) profiles for further analyze. The solution was implemented using Tikhonov regularization algorithm. The Tl 276.8 nm, 291.8nm, 292.1nm, 323.0 nm spectral lines were analyzed in detail in dependence on the discharge power. An example of spectral line deconvolution is given in Fig.1. For accuracy increasing the regularization parameter was obtained by two independent methods.

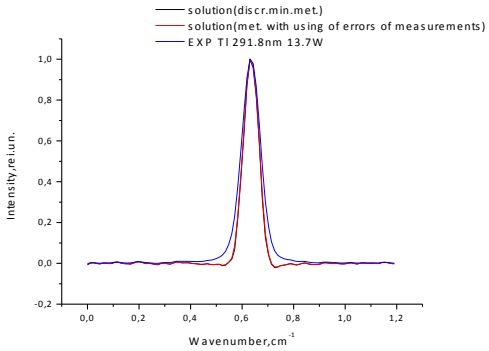

Figure 1. The comparison of 291.8nm ofTl^{205} experimental spectral line with deconvoluted ones.

Acknowledgements

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[2] N. Zorina, G. Revalde, R. Disch, Deconvolution of the mercury 253.7 nm spectral line shape for the use in absorption spectroscopy, AOMD-6 special issue of SPIE Proceedings, 2008,**7142**, 71420J-01- 71420J-09.