Investigation of Nb I spectrum in the IR wavelength range

A. Er[1], I. K. Öztürk[1], Gö. Başar[1], S. Kröger[2], R.Ferber[3], M. Tamanis[3]

[1]Istanbul University, Faculty of Science, Physics Department,34134 Vezneciler,Istanbul,Turkey
[2]Hochschule für Technik und Wirtschaft Berlin, Fachbereich 1,Wilhelminenhofstr. 75 A, 12459 Berlin, Germany
[3]Laser Centre, The University of Latvia, Rainis Boulevard, 19, 1586 Riga, Latvia
alever@istanbul.edu.tr

The aim of the present work is to investigate the hyperfine structure (hfs) of unclassified lines of niobium (Nb) in the infrared wavelength range by Fourier transform (FT) spectroscopy. The FT spectrum of Nb was recorded in the wavelength range from 6000 cm^{-1} to 12000 cm^{-1} (830 nm to 1660 nm) with a high resolution Bruker IFS 125HR Fourier transform spectrometer in the Laser Centre of the University of Latvia. A liquid nitrogen cooled hollow cathode discharge lamp has been used as light source, with a niobium hollow cathode. The discharge was run in an argon atmosphere at a pressure of around 1.7 mbar with a discharge current of about 100 mA.

For classification of spectral lines, the program *Class_Iw* [1] was applied, which contains a list of levels from [2,3,4] as well as hfs data, if available (see [5] and references therein). Using the Ritz combination principle and taking into account the selection rule for electric dipole transitions, the program calculates all possible transitions with a fine structure energy difference lying within an adjustable wave number interval around the experimental centre of gravity of the line. The hyperfine structure serves as a fingerprint of a transition.

In the our spectrum, the spectral lines of atomic niobium (Nb I), singly ionized niobium (Nb II), atomic argon (Ar I) and singly ionized Argon (Ar II) were observed. The analysis of the spectrum will be presented.

References:
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