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MICROSECOND PULSED GLOW DISCHARGE SOURCE IN "ELEMENT GD" AND "VG 9000" MASS-SPECTROMETERS

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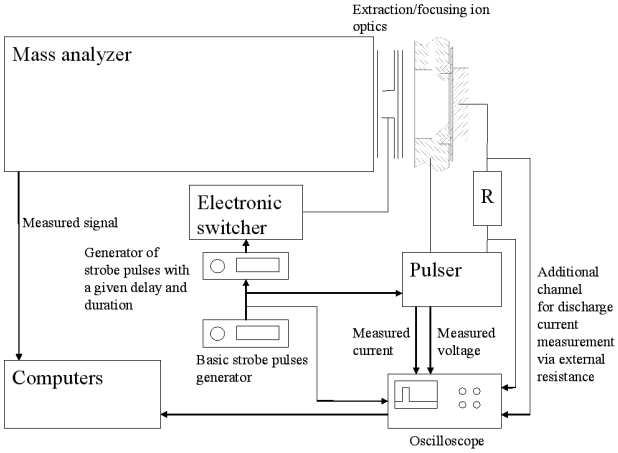
Abstract. Microsecond pulsed glow discharge (PGD) may consume several kW of instantaneous power that may lead to a significant increase of a sample atoms excitation and ionization efficiency. Improvement of analytical characteristics of a glow discharge source using pulsed mode of power supply is demonstrated earlier for different optical and mass spectral methods (Drobyshev, Turkin 1981, Bengtson et al. 2000, Huang et al. 1991, Hang et al. 1996, 1994, Farnsworth, Walters 1982), including fast flow ion source (Voronov, Hoffmann 2007). However, practical use of microsecond PGD is limited to scientific investigations.

In this work the microsecond PGD is applied to existing commercial mass-spectrometers "Element GD" and "VG 9000" to develop a system, which can be used in commercial routine analysis. Investigations are focused on possibilities of analysis with microsecond PGD and in comparison of PGD in fast flow source ("Element GD") and usual Grimm type source ("VG 9000"). Detection limits in DC and PGD modes are investigated and compared.

The secondary discharge in Grimm type fast flow source was discovered in (Voronov, Hoffmann 2007), and it certainly exists in "Element GD" instrument. However, practical application of the secondary discharge for improvement of analytical properties of the instrument is not clear. To answer this question, dynamics of ions extracted from the discharge pulses is measured using earlier developed method (Voronov, Hoffmann 2007) (see the fig.). Based on the measured ion dynamics and results of the PGD numerical simulation, influence of the secondary discharge in "Element GD" instrument is discussed.



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