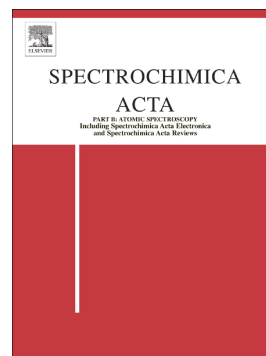


Accepted Manuscript

Microwave-driven inductively coupled plasmas for analytical spectroscopy

J. Giersz, K. Jankowski, A. Ramsza, E. Reszke



PII: S0584-8547(17)30568-2
DOI: doi:[10.1016/j.sab.2018.05.022](https://doi.org/10.1016/j.sab.2018.05.022)
Reference: SAB 5449

To appear in: *Spectrochimica Acta Part B: Atomic Spectroscopy*

Received date: 20 November 2017
Revised date: 22 May 2018
Accepted date: 22 May 2018

Please cite this article as: J. Giersz, K. Jankowski, A. Ramsza, E. Reszke , Microwave-driven inductively coupled plasmas for analytical spectroscopy. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sab(2017), doi:[10.1016/j.sab.2018.05.022](https://doi.org/10.1016/j.sab.2018.05.022)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Microwave-driven inductively coupled plasmas for analytical spectroscopy

J. Giersz^a, K. Jankowski^a, A. Ramsza^b, and E. Reszke^c

^a*Warsaw University of Technology, Warsaw, Poland,* ^b*M. Pluta Institute of Applied Optics, Warsaw, Poland,* ^c*ERTEC – Poland, Wrocław*

Abstract

New achievements in microwave-driven inductively coupled plasma technology based on formation of homogeneous H-type field inside the plasma discharge tube by using both multi-helix and partial-turn couplers are discussed in detail. These couplers range from separate washers delivering longitudinal E_z and radial E_r field components concentrated at the inner wall of the torch, through real multi-turn field shapers, which make the prevailing longitudinal H_z or hybrid EH field components, all the way to strait wires delivering a single radial E_r field component with minimum at the axis. Two novel approaches utilizing either a ring washer coupler or a multi helix coupler are developed to generating atmospheric pressure annular-shaped microwave ICPs, suitable for analytical spectroscopy. They are stably operated with argon or helium at $1\text{--}2\text{ L min}^{-1}$ flow rates at a power level of 300W while accepting up to 70 mg min^{-1} of water aerosol. For argon plasmas, rotational temperatures of OH (3300–4200K) and electron number densities $(1.9\text{--}2.2)\times 10^{15}\text{ cm}^{-3}$ are close to those measured in Ar ICP. Limits of detection for some metals were within the range of $0.006\text{--}0.035\text{ mg L}^{-1}$ using a portable OES detection system.

Keywords: annular-shaped microwave plasma, microwave-driven inductively coupled plasma, analytical spectroscopy

Download English Version:

<https://daneshyari.com/en/article/7673789>

Download Persian Version:

<https://daneshyari.com/article/7673789>

[Daneshyari.com](https://daneshyari.com)