

STANDPOINT

of the materials submitted for participation in the competition for the academic position (AP) "**professor**", in the professional field 4.2. Chemical Sciences (Analytical Chemistry), published in the "State Gazette", no. 46 of 26.05.2023 (p. 57) for the needs of the "Atomic Spectrometry Methodology Laboratory" at the Institute of General and Inorganic Chemistry (IGIC), Bulgarian Academy of Sciences (BAS)

Only candidate in the competition is Associate Professor **Albena Kirilova Detcheva-Tchakarova**, PhD; ORCID: 0000-0003-4614-7780; Scopus ID: 6602950264;

General description of the submission and the applicant. By Order No. RD-09-129/17.07.2023 of the Director of the IGIC, Prof. Dr. Radostina Stoyanova, I have been appointed as a member of the scientific jury for this competition. The materials submitted by Assoc. Prof. Dr. Albena Detcheva are in full compliance with the Academic Staff Development Act of Republic of Bulgaria and the Regulations for its implementation at BAS and IGIC-BAS. A review of the requirements for the AP "professor" showed that the candidate fulfilled the required minimum for all indicators by groups ("A, B, Г, Д, E, Ж*") and scored **973 p.** against the total required minimum of 760 p. There were no reports of plagiarism on the documents (scientific papers) submitted for the competition (Article 26(4)).

Albena Detcheva graduated from the University "St. Kliment Ohridski", Faculty of Chemistry and Pharmacy (FChP), specialty "Inorganic and Analytical Chemistry" in 1985. In IGIC-BAS (Analytical Chemistry Laboratory, currently Atomic Spectrometry Methodology Laboratory), she obtained Ph.D. in professional field (PF) 4.2. "Chemical Sciences" (Analytical Chemistry (ACh)) (2001), after that she held the positions of Assistant Professor, Senior Assistant Professor and since 2007 – Associate Professor. As a result of consistent career development in the field of ACh, the candidate has accumulated 32 years of work experience in the specialty. Assoc. Prof. Dr. Detcheva is in the Register of Academic Staff in the Republic of Bulgaria, maintained by the NACID (<https://ras.nacid.bg/dissertation-preview/2833>), where data for PhD and Associate Professor are available. During her scientific career, she conducted 2 specializations - in Amsterdam (the Netherlands) and Jena (Germany), and in 2004-2006 she was an independent national expert at the Institute for Reference Materials and Measurements of the Joint Research Centre of the European Commission (IRMM-JRC), in Geel, Belgium. Dr. Detcheva is actively involved in personnel training: co-supervisor of one part-time PhD student, who successfully defended in 2022; authorized lecturer under TrainMiC program of the European Commission for training in metrology in chemistry (since 2004); visiting lecturer at University of Plovdiv "Paisii Hilendarski" within the Master's program "Spectrochemical Analysis", in the frame of elective course "Electrothermal atomic spectrometry methods for direct analysis of solid samples" (2009-2010); co-supervisor of 4 pre-graduation internships and 5 graduation theses; lecturer of 2 courses at the Centre of Education - BAS; 4 lectures within the project BG051PO001-3. 3.06-0050; exercise lecturer at FChP-SU on ICP-OES, in the course "Applied Analytical Atomic Spectroscopy - Food Quality and Safety, Environmental Sample Analysis, Pharmaceutical Control, Cosmetics Analysis". She is a co-author of teaching materials: chapter "Atomic spectrometry methods for direct electrothermal analysis of suspensions and solid samples", In: "Experimental methods in materials research with application to environmental protection", IGIC-BAS; chapter "Direct analysis of solid samples by atomic spectrometry", In: "Fundamentals of chemical analysis" and in "Collection of lectures for training seminars on metrology in chemistry" under the TrainMiC program.

Research activity. Assoc. Prof. Dr. Detcheva is a co-author of **79** scientific articles, **58** of them published in indexed journals in the SCOPUS/Web of Science database. At the time of drafting the document, the total number of citations of the publications (without self-citations of all authors) is 441 and h-index 12 (SCOPUS). The scientific research with the candidate's participation has been presented at **153** conferences and workshops.

In the current competition, A. Detcheva participates with **19 original scientific works** and **2 book chapters**, which exclude publications from her PhD thesis and the competition for Associate Professor (2007) - according to the Higher Attestation Commission and those included in NACID. In most of the scientific papers, the candidate is the first or corresponding author, which indicates her leading research role. The articles were published in prestigious refereed journals in the field of Analytical Chemistry and their distribution according to the category of the journal in which they were published is as follows: 3 in Q1, 7 in Q2, 6 in Q3, 3 in Q4. The articles correspond thematically to the scientific specialty "Analytical Chemistry" of the competition and fully meet the requirements for holding the AP "professor" in the group of indicators "B" - 112 p. for habilitation reference based on 6 papers (min. 100 p.) and "Г" - 259 p. for 13 publications and two book chapters (min. 220 p.).

The habilitation extended reference summarizes the scientific contributions of the candidate on the topic "**Development, optimization, validation and application of "green" methods of atomic spectrometry for direct electrothermal analysis of solid samples**". Thanks to teamwork with the participation of A. Detcheva, a new ecological method for direct analysis of solid samples of organic and inorganic origin has been developed. The method uses a tunable magnetic field of an atomic absorption spectrometer, calibration with solid certified reference materials (CRMs) or aqueous standard solutions, and shows a number of advantages over instrumental methods for elemental analysis. The direct solid-sampling Zeeman and electrothermal atomic absorption spectrometric methods (SS-ZAAS or SS-ETAAS) have been optimized and validated for the determination of Hg, Cd, Pb and Mn with high accuracy in six CRM aquatic plants (1), Cd in polyethylene (2) and trace elements (Cu, Pb, Zn and Fe) in the controllable growth of high quality optical fluorite (4). The studies have shown that the SS-AAS methods are reliable, highly sensitive and can be applied to establish the certified value in reference materials of different origins. The second approach of direct analysis of solid samples by electrothermal vaporization inductively coupled plasma optical emission spectrometry (ETV-ICP-OES) is optimized for the simultaneous determination of a relatively large number of elements in plant materials (3) and of chemical elements (major, minor and trace) in archaeological glasses (5, 14). It should be underlined that for the first time the ETV-ICP-OES method was elaborated and applied for the analysis of glass artifacts, which is a contribution of Dr. Detcheva to the development of environmental chemistry in Bulgaria. As a result of optimization of all system parameters, improvements to the ETV-ICP-OES method have been achieved: the use of aqueous standard solutions for calibration standards and other modifiers as an alternative to Freon (whose use is becoming increasingly problematic), as well as the large number simultaneously determined elements in samples of diverse composition.

Author reference. Assoc. Dr. A. Detcheva has presented a brief author's summary of the scientific contributions in the publications included in the group of indicators "Г", related to the topic "Environmentally friendly Analytical chemistry" and they could be systematized into four main groups:

- In four publications (7, 9, 10, 13) the research focused on the simultaneous determination of elements in three different objects: bottled drinking water, archaeological glass finds and industrial ashes, using optimized and validated methods of total internal reflection X-ray fluorescence (TXRF) analysis corresponding to the concept of "green" analytical methods.
- Analytical characterization of the elemental composition (major, minor and trace elements) and the textural parameters of materials (fly ashes of coal from different deposits and the essential

plants *Mentha spicata* L. and *Ruta graveolens* L.) with a view to their use as sorbents for water purification from metal ions (8,15).

- Development, optimization and validation of "green" analytical methods based on ETV-ICP OES for direct analysis of solid samples for determination of major, minor and trace elements in three objects: high-purity copper (11); essential plant materials (16) and soda-lime glass (18).
- Statistical processing, cluster analysis and interpretation of databases from analysis of the macro- and microelement composition of Bulgarian potable water (12), medieval glass artifacts (17) and plant materials (19).

In fulfillment of the minimum requirements for AP "professor" (group of indicators „Д, E and Ж“), Assoc. Prof. Detcheva submits the following scientometric data: group "Д" - 220 p. based on 110 citations (excluding self-citations of all authors) on the articles submitted for the competition (min. 120 p.); group "E" - 192 p. for supervision of 1 and participation in 11 national projects, co-supervisor of a successfully defended PhD student, attracted project funds and co-author of a published university manual (min. 150 p.); group "Ж" - 140 p. based on h-index 14 based on citations from all possible databases (min. 120 p.).

In summary, the scientific contributions, publication, expert and project activity of Assoc. Prof. Dr. Albena Detcheva prove that she is a highly qualified scientist in the field of Analytical Chemistry, which fully corresponds to the scientific specialty "Analytical Chemistry" of the competition. The presented analysis of the competition materials gives me grounds for a positive evaluation as I vote "yes" and recommend the Scientific Jury to propose to the Scientific Council of the IGIC-BAS, **Assoc. Prof. Dr. Albena Kirilova Detcheva-Tchakarova to be elected to the academic position "Professor" in the professional field 4.2. Chemical sciences, scientific specialty "Analytical Chemistry", for the needs of the "Atomic Spectrometry Methodology Laboratory" at the IGIC-BAS.**

07.09.2023

Ivelina Georgieva, Prof. PhD, IGIC-BAS

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