OPINION

by Assoc. Prof. Dr. Dimo Todorov Dimov, from IICT of BAS, member of the scientific jury
(according to order № 194 / 07.10.2020 of the Director of IICT of BAS)
on the competition for the academic position "Associate Professor"
on the scientific specialty 4.6 "Informatics and computer sciences (image processing)"
from the professional area "Informatics and Computer Science",
announced in State Gazette (SG) issue 68, dated July 31, 2020,
with an applicant: Dr. Dimitar Petkov Prodanov.

For brevity of this opinion the abbreviations of the following 4 official documents will be used, namely: Low on Development of the Academic Staff in the Republic of Bulgaria (LDASRB); Regulations for the implementation of the LDASRB (RI-LDASRB); Regulations on the Terms and Conditions for Acquiring Scientific Degrees and for Holding Academic Positions at the BAS (RTC-ASD-HAP-BAS), and Regulations for the Specific Conditions for Acquisition of Scientific Degrees and for Occupying Academic Positions at IICT-BAS (RSC-ASD-OAP-IICT-BAS).

The applicant, Dr. Prodanov, submitted the documents required for the competition, according to Art. 9 (1) of the RSC-ASD-OAP-IICT-BAS. I received the respective e-copies, namely:

1. Curriculum vitae according to the European model: in Bulgarian (3 pages) and in English (4 pages);
2. Copy of the diploma for educational and scientific degree (ESD) "Doctor": PhD diploma and a certificate of NACID (National Center for Information and Documentation);
3. Certificate of internship in the specialty: declaration from IMEC (the Niederlands, 26.04.2010), letter of recommendation from Prof. Sebastian Haesler, KU Leuven (15.08.2020) and a certificate from IICT-BAS;
4. List of scientific publications for participation in this competition (4 pages);
5. List of inventions and other scientific-applied results: OC member of the workshop on INCF Training in Neuroinformatics`2013 (the Programme presented); Confirmation of AGACSE 2015 plenary report; Confirmation of a report co-authored by Neuro Informatics`2013; A list-description of 3 projects, plus 3 confirming scanned pages;
6. List of citations (5 pages), plus 12 appendices with citations of 12 of the publications, and 3 documents with comparative graphs of citations;
7. Abstracts of the scientific publications presented in the competition – in Bulgarian and English: 13 articles, 10 conference papers (3 of them in full text);
8. Copies of the scientific publications for participation in the competition: 3 issues from group "B" and 9 issues from group "G"; 3 chapters from books; 3 conference papers;
9. Information on the implementation of the minimum requirements of IICT (11 pages);
10. Information on the original scientific and scientific-applied contributions (15 pages);
11. Declaration that there is no legally proven plagiarism in scientific works.

The presentation of a medical certificate and a criminal record certificate is not required, as Dr. Prodanov is an employee of IICT-BAS (1/4 staff in the ITOSD section from 01.01.2001).

Fulfillment of the minimum national requirements under Art. 2b, para. 2 and , as well aspara. 5 (for the requirements of BAS, and IICT-BAS), according to the submitted documents under the competition.

1). Dr. Prodanov has defended a *doctoral dissertation for a scientific degree equivalent to ESD "Doctor"*, recognized in our country in the professional field (of the competition): 4.6 Informatics and computer science. The dissertation on "Morphometric analysis of the rat lower limb nerves. Anatomical data for neural prosthesis design", was defended in 2006, Twente University, Enschede, The Netherlands.

2) Dr. Prodanov is *a prominent specialist in theory and practice on the topic of the competition with proven achievements in his field.*

According to the submitted CV, since 2013 and until now, Dr. Prodanov has been working in the Department of Environment, Health and Safety of the Microelectronics Interuniversity Center (IMEC), Leuven, Belgium, on technological risk assessment (2013–16), and since 2016 he was the coordinator of NanoStreeM project on H2020. At the same time (all the time) he is an associate researcher in the Neuroscience Research Flanders department of IMEC, in basic research in the field of neurophysiology. In 2008–2013 he was a senior researcher on "Development of interfaces for recording and electrical stimulation of deep brain nuclei – deep brain stimulation and recording" in the Bioelectronic Systems group, IMEC (confirmation – a declaration by IMEC). Graduated in Medicine at MU-Sofia, 1999, he was a successful PhD student at Twente Univ., the Netherlands (2002–2006), then until 2008 he improved his research competencies on topics close to doctoral studies at university units in Enschede and Leiden (Netherlands), Brussels and Liege (Belgium). Confirmation of the successful research activity of the Applicant after 2010 is the letter of recommendation from Prof. Sebastian Haesler, KU Leuven (15.08.2020).

Since the beginning of 2019, (i.e. almost 2 years) Dr. Prodanov is a member of the ITOSD dep. at IICT, on 1/4 staff for a programmer. As from 2012, I have personally attended at least 3 IICT seminars of Dr. Prodanov on his research topics in medical image processing, which aroused significant interest among over 20–25 of the participants. The IT accents in the research activity of the Applicant are visible from the presented publications, as well as from the successfully finished, bilateral international project between FWO (Belgium) and IICT-BAS, 2012–2014 (see also item 4, group E15, below).

3) Dr. Prodanov presents *enough publications in specialized scientific journals, other than those of the dissertation.*

A total of 25 publications are presented (all in English), of which 12 are articles in prestigious issues, another 13 are reports at internationally visible conferences, and 3 are book chapters. The majority (15 items) of the publications are presented in full text (scanned e-copies), and 10 of the reports are in summary. In 13 (= 5 + 6 + 2) of the publications the Applicant is the first co-author, and in 5 (= 1 + 3 + 1) he is the second one. Two of the articles and 4 of the reports are authored by the Applicant only. A majority of the presented scientific publications are after 2007. Only 1 is earlier (since 1998), but the topic there is quite far from the topic of the Applicant's dissertation. That is, the presented publications could not be duplicated with those from the dissertation. In addition, the Applicant has submitted a declaration to this respect. The announced publications are easily detectable in the web space.

4) *The presented publications meet the minimum requirements* under Article 3 of the RSC-ASD-OAP-IICT-BAS. An analysis by groups:

A) dissertation for ESD "doctor" => 50 points; in accordance with the requirements.

B) Habilitation work – scientific publications: 3 x Q1, IF (2.116, 3.534, 3.261) => 150 points, exceeds the requirements by 50 points.

G.7) Scientific publications outside the habilitation work: 1xQ1, IF (2.032) => 50 points; 2xQ2, IF (1.174, 3.391) => 80 points; 2xQ3, IF (2,792, 2,494) => 60 points; 1xQ4, IF (0.186) => 24 points; 3 x20points => 60 points; 2x12 points => 24 points. The total = 298 points.

G.8) Published chapter of a book: 3 chapters of books presented, x15 points => 45 points.

Total (by group G) = 343 points, i.e. exceeds the requirements by 83 points.

D.11) Citation in publications referenced and indexed in WoS | Scopus (x6 points per citation): 9 cit. on P2016B => 54 points.; 43 cit. of M2013B => 258 points (declared 198 only); 3 cit. on P2011B => 18 points (declared 9 only); 6 cit. on D2019B => 36 points; 1 cit. of P2017G2 => 6 points; 45 cit. on M2013B => 270 points; 5 cit. on W2013G => 30 points; 3 cit. on M2010G => 18 points; 14 cit. on M2009G => 84 points; 2 cit. on P2009G => 12 points; 9 cit. on P2008B => 54 points; 12 cit. of P1998G => 72 points . Totally 152 cit. => 912 points (declared 876 only), i.e. exceeding the requirements by 806 points.

E.14) Participation in a national scientific or educational project: IBRO Fellowship => 10 points.

E.15) Participation in an international scientific or educational project: FWO-BAS Project "Application of the multi-scale space in segmentation of ultrasound and time-lapse microscopic images" => 20 points.

E.16) Management of a national scientific or educational project: BrainSTaR: Wireless Microsystem for Brain Stimulation and Recording in Small Animal Models, => 20 points.

Total (by group E) = 50 points, i.e. exceeding the requirements by 30 points.

Total (for all groups A–E) = 1469 points, i.e. exceeding the total requirements by 969 points.

Nine (9) of the presented publications are with IF (totally = 20.98); and only one publication has SJR (0.178). Twelve (12) of the presented cited publications collect 152 citations. A look at the ResearchGate database shows that there the Applicant has submitted 90 publications, of which he collects 768 citations. Furthermore, the links to the 4 research DBs indicated by the Applicant indicate as follows: NACID: 6 publications; ORCID: 57 publications; Scopus: 45 publications giving 588 citations (88 of them in 2020) & h-index = 14; Publous: 41 publications, 517 citations, h-index = 12.

5) *A declaration of originality of the presented publications results is presented.*

By the way, only 2 of the publications are after 2018. Thus, if we consider that 2–3 years are a sufficient period to clarify various forms of plagiarism in publications in reputable (and well-visible) issues, as we have in this case, then this is one more a confirmation of the originality of the results. In this sense, also the letter of recommendation from Prof. Sebastian Haesler, KU Leuven (15.08.2020) can be interpreted.

Major scientific and applied contributions

Dr. Prodanov has formulated / summarized (in 15 pages) his research interests and the respectively achieved results in 3 areas:

Area 1: Neuroinformatics frameworks for signal processing and data analysis;

Area 2: Algebraic tools enabling computational biology;

Area 3: Neuroprostheses and plasticity of the Central Nervous System.

The publications announced to the competition are divided into 3 areas, as follows: **A1** (14 publications, with a total of 34 contributions), **A2** (3 publications, with a total of 10 contributions) and **A3** (9 publications, with a total of 17 contributions). Two of the publications (P2008B, and M2013B) fall into two of the areas (A1 and A2), but the respective contributions (and which is correct) are not summarized. Dr. Prodanov intends to continue his future work mainly in the both of these areas, which as I think are also interesting for IICT-BAS. In particular, on **A1** he will most likely continue the development (launched in 2014) of the Active Segmentaiton platform, aimed at segmenting (medical) images and based on machine learning (and self-learning). Obviously, the platform is of interest not only to specialists in the so-called. Neuroinformatics, for and for a wider class of specialists in the field of image processing.

For **A2**, Dr. Prodanov is currently working mainly in the so-called "descriptive field" in computational biology (CB). He has specialized in open source computer algebra Maxima, for which he developed a package for Clifford algebras, which he will also develop in the near future to a package for differential forms based on Clifford. The latter will facilitate the interpretation of mathematical works, Clifford geometrically formulated, often recently in CB. In addition, he relies on the development of computer-algebraic tools to find analytical solutions and cites as an example the "CIR model in epidemiology." The latter also gives me a reason to mention the Applicant's quick reaction to current problems, for example COVID-19 (see arXiv: 2010.07000v1 [q-bio.PE] 9 Oct 2020). The problems of anomalous diffusion, which according to Dr. Prodanov are closely intertwined with the theory of special functions, will be of other interest in his future work.

Significance of contributions to science and practice

Neuroinformatics and computational biology are undoubtedly new significant areas of Informatics on the border with modern medical research, in the modern conditions, the power of computer technology and the tools based on computing environments, databases and innovative visualization. According to Dr. Prodanov, who is obviously a highly specialized computer scientist and at the same

time a medical doctor by education, the point of view on this border lies probably on the other side. Nevertheless, I consider his contributions, as presented in his habilitation work, to be significant, both for the specific science and for the practice of informatics, and especially for the medical practice.

Some remarks and recommendations

1) In BAS and in particular IICT-BAS it is accepted to generalise the contributions in other three groups (scientific, scientific-applied and applied ones), as the possible subdivisions in these groups to be laconic, arranged by importance and minimized as a number. This, of course, does not diminish the structure and scope of the description of his contributions chosen by the Applicant;

2) I did not understand the meaning of the following document:

- FENSALetter.pdf (official confirmation letter for the accepted symposium within FENS, 2008 in Geneva, but I do not find a connection with (the name) of the Applicant);

3) I admire one of the future goals of the Applicant "to introduce and promote the relevant terminology" in this country, recalling that this is not an easy task where there will be a lot of discussions. For example, the selected translation of "Computational Biology (CB)" into "Биологията на изчисленията (БИ)" is puzzling; the more correct translation is "изчислителна биология" or even "био изчисления", ...

CONCLUSION

All requirements, minimal and/or specific ones, according to the LDASRB with the Regulations for its implementation, as well as the respective RTC-ASD-HAP-BAS and the RSC-ASD-OAP-IICT-BAS have been met. In some cases they are even exceeded, but without tendentiousness, and probably due to random correlations in the tables' formulations. The contributions (scientific, scientific-applied and applied ones) of the presented research works are significant and relevant to date. *My personal assessment, given the submitted documents and knowledge of the Applicant is definitely positive*. The 3 remarks written above do not affect my assessment and can be taken into account at the Applicant's desire in his future work.

I propose to the Scientific Jury to unanimously vote a recommendation to the Scientific Council of IICT-BAS for the election of Dr. Dimitar Petkov Prodanov to hold the announced position of "Associate Professor" in the scientific specialty 4.6 "Informatics and Computer Science (Image Processing)" from the professional field "Informatics and Computer Science", for the needs of the ITOSD section of IICT-BAS.

Date: 06.12.2020

JURY MEMBER:

/ Assoc. Prof. Dr. DT Dimov /