

## OPINION

Regarding the competition of the Institute of Biophysics and Biomedical Engineering – BAS for the academic position “Professor” in the Section “Bioinformatics and Mathematical Modelling” in the field of higher education 4. Natural Sciences, Mathematics and Informatics, the professional field 4.6. **Informatics and Computer Sciences**, scientific speciality Informatics (Informatics tools in Biomedicine)”, announced in the State Gazette issue 54/12.06.2026

**Candidate:** Dr. **Ljudmila Pavlova Todorova**, Assoc. Prof in Section “Bioinformatics and Mathematical Modeling, IBBE – BAS, Sofia

**Member of the Scientific Juri:** **Ketty Georgieva Peeva**, Prof. DSci

### 1. General Information and Biographical Data on the Candidate

In accordance with the order № 695/15.07.2026 of the Director of the IBBE – BAS, Sofia as a member of the Scientific Jury under the procedure for the above described competition I was selected to present my opinion for the candidate Assoc. Prof. Dr. Ljudmila Pavlova Todorova.

I received a link to download the competition documents.

All documents are presented and I find no procedural violation.

**Education.** **Ljudmila Pavlova Todorova** obtained her Master's degree in Automation and Telemechanics, the Faculty of Automatics, Technical University of Sofia. In 2006 she obtained the ESD Doctor in the field of Cybernetics.

Her **professional development** from 1996 to now is at the Central Laboratory of Biomedical Engineering “Prof. Ivan Daskalov”-BAS, later – Institute of Biophysics and Biomedical Engineering (IBBME), where she deals with scientific research in informatics, statistics and biomedicine. Since 2011 she has held the academic position Associated Professor at the aforementioned workplace.

### 2. Quantitative characteristics of the presented materials

**Ljudmila Pavlova Todorova** participates in the competition with the following materials:

- **34** scientific papers, all co-authored. Of these:
  - 12 papers with indicator B4. 2 of them have an IF Q1 and 3 of them have IF Q4.
  - 22 papers with indicators Г7 and Г8. 1 of them has IF Q1, 10 of them have IF Q4.
  - 16 papers are published in journals with IF.
  - 11 papers are published in journals with SJR.
  - 1 Chapter in a monograph.

- Data are presented for 208 citations in Scopus and 312 in other publications.
- **h-индекс:** *Scopus* – 6; *Web of Science* – 5.
- She has supervised **one doctoral student** who successfully defended the thesis.
- **9 research-scientific projects** in which the candidate is a team member, on one of them she is coordinator on behalf of the IBFBME - BAS.

### **3. General characteristics of the candidate's research and applied research activities**

Associated Prof. Dr **Ljudmila Pavlova Todorova** has submitted 34 scientific publications for participation in the competition organized by the Institute of Biophysics and Biomedical Engineering – BAS, which I accept for review. They relate to the subject matter of the competition and the candidate did not use them in her doctoral dissertation or in the competition for the Associated Professor. Separate lists are provided for the latter – 7 publications for the ESD “Doctor” and 25 publications for the Academic position Associated Professor.

### **4. Key scientific and applied scientific contributions**

The scientific papers accepted for consideration enrich the theories of intuitionistic fuzzy sets (IFS), of intercriteria analysis (IKA) and of index matrices (IM).

The contributions are scientific and applied-scientific. This systematization is provisional in nature – the research concerns several interconnected areas.

**The scientific contributions are:**

- 4.1 Enriching the theory of IFS: a new ordering over intuitionistic fuzzy pairs is introduced, new relations and operations for geometrical ordering are introduced.
- 4.2. For IKA and IM are proposed: new algorithms and modifications to techniques and approaches with applications on real data from neurosurgery and urology (prostate cancer); new aggregation approach with application in input data processing.
- 4.3. For generalized nets are proposed: generalized net decision-models in medicine – neurology, ophthalmology and neurosurgery, as well as for the needs of clinical practice in the fields of neurology and neurosurgery.

**The scientific-applied contributions** are in the field of medicine. The candidate uses the IKA together with IFS and IM:

- 4.4. In the field of neurology, ophthalmology, intensive care and neurosurgery (identifying interactions between criteria and supporting diagnostic decision-making in diagnosis, treatment, prevention and rehabilitation).
- 4.5. In the field of neurology and neurosurgery for the forming indices for clinical practice.
- 4.6. For the patients with multiple sclerosis:

- early detection of cognitive impairments – participation in the development of the computer system *Rila CogniSoft for the assessment and rehabilitation* of neuropsychological impairments in individuals with multiple sclerosis;
- In formal description of the algorithms for software description for determining the course of multiple sclerosis; registration, assessment and rehabilitation of cognitive impairments in such individuals.

Data are presented for **208 citations** in SCOPUS and **312** in other publications, excluding self-citations. The citations are from collectives from Bulgaria and abroad, in prestigious international journals and in conference proceedings, in Springer periodicals and periodicals in Bulgaria.

## 5. *Scientific-research projects*

**9 scientific-research projects**, in which the candidate is a member of the team, on one of them she is coordinator of the team of the IBFBME – BAS (the project is with basic organization Medical University – Sofia). Of these:

- 4 national for ICA with applications in medicine;
- 3 on international cooperation with Slovakia and Poland on IFS, GM and applications;
- 2 on Operative Program „Innovations and Competitiveness“.

The projects are on the theme of the competition – ICA, IFS, GN, information systems, decision making, modelling, data processing under conditions of uncertainty and fuzziness with variety of applications in medicine.

## 6. *Participation in conferences*

Participation in 37 international scientific forums for the period 2011-2026, held in Netherlands, Poland, Bulgaria, Portugal, UK, Sweden, Austria, Germany Belgium etc. Publications are in the concourse area.

## 7. *Significance of the contributions to the science and practice*

The submitted scientific papers for participation in the competition have scientific and applied-scientific contributions.

The basic scientific and applied-scientific contributions concern IFS, ICA, GN, IM and their applications in variety of subjects, as described in p. 4.

All contributions are correctly described in the presented author's summary.

The quantitative requirements for the criteria for holding the academic position „Professor“ are completely satisfied. There are no unsatisfied indicators, they are even exceeded – for instance scientific papers, citations of them.

I do not have any **personal impressions** from Associated Prof. Dr **Ljudmila Pavlova Todorova**.

## 8. Critical remarks and recommendations

For publication № 8 the number of pages and the place of acceptance are not given. I saw that it was accepted in Inteface Focus Vol. 16, Issue 3, 2026.

I recommend that the candidate publish independently and not only in co-authorship.

I have no other critical remarks regarding the submitted materials or the candidate. The concurse materials are prepared carefully and prezise that significantly facilies their processing. The candidate can work in team.

The submitted review shows that Associated Prof. Dr **Ljudmila Pavlova Todorova** satisfies all national requirements in every aspect, as well as those of the Rules of of the Institute of Biophysics and Biomedical Engineering – BAS for the academic position “Professor” in **4.6 Informatics and Computer Sciences** by group of indicators, in most of the cases significantly exceeding them.

**Recommendations:** I recommend fostering her independent research. It wold be beneficial for her to work with young researchers toward their “Doctor’s” education and degree.

## CONCLUSION

Based on the foregoing I consider that the reviewed papers, and the scientific and applied scientific contributions of Associated Prof. Dr **Ljudmila Pavlova Todorova** meet all the requirements of the Regulations for the implementation of the ADAS in RB and of the regulation of IBBME – BAS for the academic position “Professor”. I take the liberty to propose Associated Prof. Dr **Ljudmila Pavlova Todorova to occupy the academic position “Professor”** in the professional field **4.6. Informatics and Computer Sciences**, scientific speciality Informatics (Informatics tools in Biomedicine)”, in the field of higher education 4. Natural Sciences, Mathematics and Informatics, competition of the Institute of Biophysics and Biomedical Engineering – BAS, Sofia.

**Date: 29.09.2026**

**Member of the Jury:**

(Prof. DSc **Ketty Peeva**)