

OPINION

by Prof. Dr. Eng. Zvezditsa Petrova Nenova,
Technical University of Gabrovo

on the materials submitted for participation in the competition
for the academic position of Professor
in the field of higher education – 5. Technical Sciences,
professional field – 5.2 Electrical Engineering, Electronics and Automation,
specialty – “Electric Power Supply and Electrical Equipment” (Lighting and Installation
Engineering)

In the competition for the academic position of Professor, announced in the State Gazette, issue 48/13.06.2025, and on the website of the Technical University of Gabrovo (TU–Gabrovo), for the needs of the Department of Electric Power Supply and Equipment at the Faculty of Electrical Engineering and Electronics, the sole candidate is Associate Professor Dr. Eng. Plamen Tsenkov Tsankov.

This opinion has been prepared in accordance with Order № 3-01-412/25.09.2025 of the Rector of TU–Gabrovo and the decision of the scientific jury for the procedure (Protocol № 1/26.09.2025).

1. Overview of the content and results in the submitted works

The candidate, Assoc. Prof. Dr. Eng. Plamen Tsenkov Tsankov, has submitted for participation in the competition for the academic position of Professor a total of **36** scientific works, **1** patent application document, and **2** utility model documents. The scientific works include **34** scientific publications and **2** textbooks.

The publications submitted by the candidate are grouped as follows:

- Group B.4. Habilitation work – scientific publications (not fewer than 10) in journals indexed in world-renowned scientific databases – **10**;
- Group G.7. Scientific publications in journals indexed in world-renowned databases – **3**;
- Group G.8. Scientific publications in non-indexed but peer-reviewed journals or edited collective volumes – **21**.

A classification of the publications submitted for the competition can be made as follows:

By type:

- Book chapters – **3**;
- Articles – **12**;
- Conference papers – **19**.

By significance:

- Publications in journals with an Impact Factor (IF) – **4**;
- Publications in journals with an Impact Rank (SJR in Scopus) – **7**.

In addition to the **11** publications with IF or SJR, another **2** publications are indexed in Scopus (a total of **13** publications in internationally recognized scientific databases).

By place of publication:

- Book chapters abroad – **3**;
- Articles in international journals – **8**;
- Articles in national journals – **1**;
- Articles in university proceedings in Bulgaria – **3**;
- Papers in proceedings of international scientific conferences in Bulgaria – **12**;
- Papers in national scientific conferences, sessions, and seminars – **7**.

By language:

- In English – **17**;
- In Bulgarian – **17**.

By number of co-authors:

- Single-author – **6**;
- With one co-author – **9**;
- With two co-authors – **11**;
- With three or more co-authors – **8**.

The content and results of the publications submitted for the competition are grouped by the candidate into the following main thematic areas:

I. Research, modeling, and optimization of photometric and electrical parameters and characteristics of LED light sources and luminaires

The publications in this thematic area address issues related to photometric, spectral, and electrical parameters, the influence of temperature on the characteristics of light sources, and optimization opportunities through three-dimensional computer modeling and the design of new structural solutions. The main focus is on LED luminaires as a leading technology in modern lighting engineering.

A comparative analysis has been conducted on luminous flux, light distribution, luminance, and glare when using different secondary optical systems – diffusers, lenses, and prismatic elements.

Spectral characteristics of LED lamps during heating and steady-state operation are examined, showing changes in correlated color temperature and color rendering index. In studies of blue light hazard, dependencies have been obtained between color temperature and risk level.

Using computer modeling and Monte Carlo ray tracing methods, optimization of lens shapes and optical systems has been performed. The electrical parameters of SMART LED luminaires have been analyzed, including power quality during dimming and color temperature variation. Values for harmonic distortion, power factor, and efficiency have been established for large-scale implementation of LED technologies.

II. Research, design, and optimization of indoor and outdoor lighting installations

The publications in this thematic area focus on practical aspects of lighting engineering – research, design, and optimization of lighting systems for buildings, streets, and industrial facilities, with the direct application of scientific research to real projects achieving economic and environmental effects through CO₂ emission reduction.

Methodologies have been developed for techno-economic evaluation of lighting system modernization using LED technologies. Intelligent systems for remote control and monitoring via GSM/GPRS and cloud platforms have been implemented, facilitating the operation and maintenance of lighting installations.

III. Research on power supply systems with photovoltaic power plants

The publications in this thematic area examine the characteristics of various types of photovoltaic (PV) modules, the influence of climatic and operational factors on their efficiency, and their integration into the power grid.

Temperature coefficients of amorphous and polycrystalline PV modules under real operating conditions, as well as hourly variations of solar radiation, have been analyzed. Regression models have been developed, allowing for energy yield forecasting of PV systems.

The influence of dust and ash on PV panel efficiency has been studied. Issues of cybersecurity in PV systems with hybrid inverters are discussed, along with potential risks to the stability of the power supply system and the need for the development of protective mechanisms.

As evidence of the scientific impact of his research, Assoc. Prof. Dr. Eng. Plamen Tsankov has provided a list of **31** citations in Scopus or Web of Science of 7 scientific publications. Excluding self-citations by all co-authors, the candidate has an h-index of **4** in Scopus.

He has also submitted documentation for 6 peer reviews prepared for scientific journals indexed in world-renowned databases.

2. General characteristics of the candidate's activity

2.1. Teaching and pedagogical activity

The candidate has a long academic teaching career – over 27 years. He began his teaching activity as an Assistant Professor during the period 1997–2001, subsequently working as a Senior Assistant Professor from 2001 to 2011, Chief Assistant Professor from 2011 to 2015, and Associate Professor since 2015 at the Department of Electric Power Supply and Equipment, Technical University of Gabrovo.

He is the leading lecturer in the following courses: Electrical Supply, Lighting and Installation Engineering, Industrial Power Supply Systems, Computer-Aided Design in Power Supply, which are included in the curricula of the Bachelor's degree program Electrical Power Engineering and Electrical Equipment (both full-time and part-time modes of study).

He also teaches the following courses in the Master's degree program Electrical Power Engineering and Electrical Equipment (full-time and part-time): Automatic Devices in Power Engineering, Optimization and Management of Power Supply Systems, Computer-Aided Design in Power Engineering (course project).

He has developed syllabi for 14 courses included in the Bachelor's and Master's degree programs in Electrical Power Engineering and Electrical Equipment.

The candidate participates in the competition with two co-authored textbooks: Lighting and Installation Engineering, and Industrial Power Supply Systems.

He has been the supervisor of two PhD students who have successfully defended their dissertations.

2.2. Scientific and scientific-applied research activity

According to the reference provided in the candidate's documentation, Assoc. Prof. Dr. Eng. Plamen Tsankov has been the principal investigator of 5 research projects receiving targeted state budget funding through the University Center for Research and Technologies at the Technical University of Gabrovo, and 3 externally funded projects with organizations outside TU–Gabrovo.

As shown in the link provided to the University Information System of TU–Gabrovo, since his appointment as Associate Professor, he has participated in 8 international scientific and educational projects, and projects under Operational Programmes.

He has been involved in the establishment of 2 teaching laboratories and 2 research laboratories.

The candidate is a member of several professional organizations, including: IEEE (Institute of Electrical and Electronics Engineers), International Commission on Illumination (CIE), Bulgarian National Committee on Illumination, Union of Physicists in Bulgaria.

He also serves on the Boards of Directors of: the Federation of Scientific and Technical Unions in Bulgaria, the National Committee on Illumination in Bulgaria, the Union of Electronics, Electrical Engineering and Telecommunications.

He is Chairman of the Professional Section EAST in the Regional College – Gabrovo of the Chamber of Engineers in the Investment Design (KIIP), as well as of the Territorial Organization of the Scientific and Technical Union – Gabrovo.

2.3. Implementation activities

The materials submitted for the competition include documents for 2 registered utility models at the Patent Office of the Republic of Bulgaria (BG/U/2019/4529 – LED street luminaire; Utility Model Certificate № 5035 U1 – Automated control system for road tunnel lighting installations) and 1 patent application (BG/P/2025/114068 – Automated control system for road tunnel lighting installations).

Several of the presented publications and applied research contracts with external partners demonstrate implemented projects focused on the research and design of street lighting systems in

various Bulgarian cities, modernization of street lighting using LED technologies, and implementation of intelligent control via GSM/GPRS and cloud platforms. Additionally, the candidate has developed measurement stands for testing photometric, spectral, and electrical parameters.

3. Contributions. Significance of the contributions to science and practice

I accept the contributions formulated by the candidate in the submitted publications. They are of a scientific, scientific-applied, and applied nature.

The *scientific contributions* of the publications are related to the development of new approaches, methodologies, and new solutions. They can be summarized as:

- Development of a methodology for analyzing the photometric characteristics of LED luminaires with different optical systems.
- Development of a three-dimensional computer modeling approach for the analysis of optical systems of LED luminaires of various types.
- Proposed optimization solutions for the components and the optical systems of LED luminaires, improving photometric performance and overall efficiency across various LED technologies and lighting types, representing an integrated approach to enhancing lighting quality and effectiveness.

Scientific-applied contributions are related to the enrichment and advancement of existing solutions and models, the establishment of dependencies, and the attainment of new and confirmatory results within the thematic areas of the research. They include:

- Study of spectral changes during the warm-up of LED lamps and assessment of their impact on correlated color temperature and color rendering index.
- Establishment of relationships between color temperature and risk level in the presence of hazardous blue light emissions from various LED luminaires.
- Analysis of higher harmonics of current and power factor of LED luminaires during dimming and color temperature control, in the context of power quality assessment.
- Development of a model for forecasting the energy yield of a photovoltaic power plant using regression analysis of hourly solar radiation variations.
- Determination of the effect of dust and ash on the efficiency of photovoltaic panels in a continental climate.
- Analysis of cyber risks for photovoltaic systems with hybrid inverters in relation to power system stability.
- Determination of temperature coefficients for voltage, current, and power of amorphous and polycrystalline photovoltaic modules under real operating conditions.

The *applied contributions* refer to:

- Implementation of projects for street lighting modernization, resulting in electricity savings and reduced CO₂ emissions.
- Deployment of intelligent monitoring and remote control systems (GSM/GPRS, cloud platforms) to improve reliability and reduce maintenance costs.
- Conduct of energy studies and optimization of interior lighting in industrial facilities, demonstrating cost-effectiveness and rapid return on investment.
- Development of a prototype greenhouse LED luminaire with controlled spectral distribution.
- Analysis and assessment of the cost-effectiveness of grid-connected and standalone photovoltaic lighting systems (PV-LED).
- Design of a battery charge management device for standalone photovoltaic lighting systems.

4. Evaluation of the candidate's individual contribution

Of the submitted publications, 6 (17.6%) are single-authored, and in 21 (61.8%) of them the candidate is the first author. In total, the candidate has a leading contribution in 79.4% of the publications, which demonstrates his substantial personal involvement in the research presented in the competition.

5. Critical notes and recommendations

The candidate is encouraged to continue his research activity with increased publication of scientific results in journals indexed with an Impact Factor in Web of Science and SJR in Scopus.

6. Personal impressions

I have known Assoc. Prof. Dr. Eng. Plamen Tsankov since his time as a student, Assistant Professor, and PhD student at the Technical University of Gabrovo. I have observed his professional growth within the University through successive academic positions up to the rank of Associate Professor. He is highly motivated, precise, and responsible in his work, demonstrating excellent skills in teaching and methodological activities, participation in international and institutional research and educational projects, and in organizational activities.

I have no joint publications with the candidate.

7. Conclusion

Based on the presented data and the performed analysis, I consider that Assoc. Prof. Dr. Eng. Plamen Tsankov meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation, and the Regulations for the Acquisition of Scientific Degrees and the Occupation of Academic Positions at the Technical University of Gabrovo. Through his publication activity, research achievements, and teaching and pedagogical work, the candidate meets and significantly exceeds, according to several criteria, the minimum national requirements by groups of indicators, as well as the scientometric indicators of the Technical University of Gabrovo for appointment to the academic position of Professor.

In view of the above, I recommend that Assoc. Prof. Dr. Eng. Plamen Tsankov be appointed to the academic position of Professor in the field of higher education – 5. Technical Sciences, professional field – 5.2 Electrical Engineering, Electronics and Automation, specialty – “Electric Power Supply and Electrical Equipment” (Lighting and Installation Engineering).

07.11.2025

Member of the Scientific Jury:

/Prof. Dr. Eng. Z. Nenova/