OPINION

on the materials for participation in a competition for the academic position of "professor", field of higher education 4. Natural sciences, mathematics and informatics, 4.4. Earth Sciences, scientific specialty "Ecology and Ecosystem Protection", in the discipline "Solid Waste Processing Technologies" announced by the Forestry University in the State Gazette 100/16.12.2022, procedure code ELLAAsP-1222-98.

Candidates for participation in the competition are:

1. **Associate Professor Ekaterina Ivanova Todorova, Ph.D., Eng**

Opinion by: Dr. Zdravka Veselinova Burieva-Nikolaeva, associate professor in code 4.4. Earth Sciences from the University "Prof. Dr. Asen Zlatarov", Burgas

1. Brief biographical data about the candidate

In 1985, Associate Professor Dr. Ekaterina Ivanova Todorova graduated from the Higher University of Chemical Technology, Sofia - Master, Chemical Engineer, Professional field 5.10. Chemical technologies; Field of higher education: Technical Sciences

In 1987 – Patent specialist and graduated from the Higher Economic Institute, Sofia

In 1995 – Candidate of technical sciences (doctor), Higher Attestation Commission; specialty: Technologies of inorganic substances; Field of higher education: Technical Sciences

In 2006 – Associate Professor; specialty: "Ecology and ecosystem protection" (Solid waste processing technologies); Professional direction 4.4. Earth Sciences; Field of Higher Education: Natural Sciences, Mathematics and Informatics

Associate Professor Dr. Ekaterina Ivanova Todorova participates as a project manager at NIS, University of Mining and Geology; Chemist of University of Chemical Technology and Metallurgy, patent specialist; coordinator Transport and logistics of dangerous substances and mixtures", the Forestry University; from 1996 until now - Expert in the field of environmental protection and impact assessment, Ekotech Consult - Ltd.

From 2020 to now - held the position of Dean of the Faculty of Ecology and Landscape Architecture and Associate Professor in the Department of Ecology, Protection and Restoration of the Environment.

2. Conformity of the submitted documents and materials of the applicant with the requirements of the rules of the University of Forestry

The scientific works indicated in the individual report of Associate Professor Ekaterina Ivanova Todorova, Ph.D., cover the minimum national requirements for scientific and teaching activity for the acquisition of the academic position "professor", as follows:

- group of indicators A: 50 points; with a requirement of 50 points;
- group of indicators B: 100 points; with a requirement of 100 points;
- indicator group Г: 308.1 points; with a requirement of 200 points;
- indicator group Д: 850 points; with a requirement of 100 points;
- indicator group E: 764 points; with a requirement of 150 points

The total number of points for the indicator groups is 2072.1 points, with a requirement of 600 points.

The submitted documents of the candidate are in accordance with the requirements according to

the Regulations of the Forestry University.

3. Evaluation of the candidate's educational and teaching activities

The Faculty of Ecology and Landscape Architecture is responsible for the overall organization of the educational and research activities of Associate Professor Dr. Ekaterina Ivanova Todorova.
Teacher of Bachelor and Master students, specialty "Ecology and Environmental Protection". Joint elective master's programs with the University of Mining and Geology, Sofia and Technical University Gabrovo.
Supervisor of 2 successfully defended doctoral students in the field of "Earth Sciences", scientific discipline "Ecology and ecosystem protection".
The submitted materials for the competition confirm the fulfillment of the national requirements for the candidate's scientific and teaching activities.

4. Evaluation of the candidate's scientific, applied scientific and publication activities

4.1. Participation in scientific, scientific-applied and educational projects

- Head of scientific and scientific-applied projects with contractor Forestry University: 5 pieces as head and 6 pieces. as a participant;
- Head of Environmental Impact Assessment Reports and Environmental Expertises with contractor Forestry University.
- Scientific-applied projects, ecological expertise and environmental impact assessments with contractor private companies and non-governmental organizations - Ekotech Consult-OOD, Sofia: as a leader in the field of climate change – 6 units; as a participant in the field of waste - 15 pcs.; as a participant in the field of preparing strategies, programs and plans - 2 pcs.
- Head of scientific projects and contractual topics with contractor University of Mining and Geology "St. Iv. Rilski" and work on scientific projects at the University of Chemical Technology, Sofia.

The number of participations of Associate Professor Ekaterina Ivanova Todorova in scientific, scientific-applied and educational projects is impressive. This undoubtedly speaks of initiative, reliability and a lot of knowledge in the field.

4.2. Characteristics of published scientific results

The scientific and scientific-applied activity of Assoc. Dr. Ekaterina Ivanova Todorova is versatile and covers the following scientific areas:

- Minimization and utilization of waste as a raw material and energy resource, including through industrial symbiosis;
- Ecological management of mining waste;
- Environmental efficiency of waste treatment technologies.

The submitted evidentiary materials of the publications of the above-mentioned areas meet the national requirements. This gives me reason to give a positive assessment of the quality of the published scientific results.

4.3. Reflection of the candidate's scientific activity in the literature (citability)

- Д10: Citations or reviews of scientific publications, referenced and indexed in world-famous databases with scientific information or in monographs and collective volumes - 156 items of 5 points: 780 points;
- Д11: Citations in monographs and collective volumes with scientific review - 6 items of 3 points: 18 points;
- Д12: Citations or reviews in non-refereed journals with scientific review – 26 items of 2 points: 52 points.

Total: 850 points, with a requirement of 100 points.

4.4. Contributions in the works of the candidate/s (scientific, scientific-applied, applied)
Under direction 1 main contributions:

- It has been established that when industrial waste water is purified by a hybrid process combining electrocoagulation and microfiltration, the resulting fresh sludge leads to water purification, reducing the content of some investigated pollutants;
- It has been established, at the national level, that the quantities of composite waste from packaging by municipalities are increasing, which necessitates finding an effective solution for their treatment;
- A scheme for the treatment and utilization of the solid household waste generated in Sofia is proposed;
- The need to build at least one installation for thermal disposal of waste from humanitarian and veterinary medicine has been proven in each regional center;
- Hazardous waste has been identified quantitatively and by location at the national level; a modern household waste management system was developed;
- It has been proven experimentally, through sampling, processing and morphological analysis, that the location of municipalities at the national level does not affect the morphological composition;
- It has been established that the classification of sludge waste from sewage treatment plants as hazardous or non-hazardous predetermines the way of their treatment;
- The exact quantities for initiating the initial C/N ratio (30:1) of green and brown waste in the Municipality of Dobrich have been determined.

By direction, 2 main contributions:

- It has been established that mining waste from the processing of copper and polymetallic ores containing gold and silver do not contain substances hazardous to the environment and human health;
- It has been confirmed that the mining waste obtained from cyanide extraction of gold meets the regulatory requirements;
- It has been proven that utilization of mining waste for backfilling of mine workings does not lead to additional leaching of the impurity elements contained therein;
- It has been proven that the preliminary treatment of mining waste by separating the clay from it is a prerequisite for minimizing the amount of waste and the utilization of clay as an alternative to naturally mined clay;
- It has been proven that the incorporation of mining waste in the construction of forest roads is effective in strengthening them.

Methodological contributions: it has been established that the classification of mining waste requires the combined application of mining waste legislation and waste management legislation, with the origin and chemical composition of mining waste being the leading criterion; a methodological approach was developed for the classification of mining waste and its behavior in the environment by applying a static and kinetic leaching test.

By direction, 3 main contributions:

- An evaluation of the ecological efficiency of various actual installations for composting and thermal treatment of bio-waste was made, based on the international standard ISO 14045:2012;
- Through quantitative parameters, the ecological efficiency was calculated for different thermal methods of waste treatment;

- It has been found that by calculating the ecological efficiency, the appropriate methods of treating hazardous waste can be identified;
- It has been proven that the environmental efficiency of waste recycling depends to a significant extent on the economic value of the process (respectively, the amount of recycled waste). It has been found that as disposal costs increase, thermal methods will become more environmentally efficient.

Methodological contribution: a unified system for detailed, concrete and reliable assessment of environmental efficiency through thirteen groups of indicators is proposed. This system can be used to evaluate investment proposals in terms of their impact on the environment.

5. Evaluation of the candidate's personal contribution

The candidate's personal contribution to the presented research is unquestionable. I give a positive rating on this indicator.

6. Critical notes and recommendations

The materials presented by Assoc. Dr. Ekaterina Ivanova Todorova for participation in the competition for the academic position "professor" are well classified and formatted, according to the requirements. All works are well structured in terms of content, interpretation and analysis of the obtained results.

I recommend that the candidate continue to share the accumulated experience with students, doctoral students and the academic community both in Bulgaria and abroad.

7. Personal impressions

I have't personal impressions of the candidate.

8. Conclusion

I SUGGEST the candidate ASSOCIATE PROFESSOR DR. EKATERINA IVANOVA TODOROVA to occupy the academic position of "PROFESSOR", field of higher education 4. Natural sciences, mathematics and informatics, 4.4. Earth Sciences, scientific specialty "Ecology and Ecosystem Protection", in the discipline "Solid Waste Processing Technologies".

Opinion provided:

Signature

Opinion submitted on: 31 March 2023