

**REVIEW**

to occupy the academic position:

"Professor"	
"Associate Professor"	x
	one of the academic positions indicated shall be marked with the sign "X"

**Candidates to occupy the position:**

<b>1</b>	<b>Chief Assistant</b>	<b>Ph. D</b>	<b>Kalin</b>	<b>Simeonov</b>	<b>Krumov</b>	<b>UCTM</b>
№	academic position	scientific degree	name	middle name	last name	workplace

**Scientific area:**

<b>5</b>	<b>Technical Sciences</b>
code	name

**Professional area:**

<b>5.4</b>	<b>Energetics</b>
code	name

**Scientific specialty:**

<b>Industrial Heating Technology</b>
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**The competition has been announced:**

<b>67</b>	<b>4.08.2023r.</b>	<b>Silicate technology</b>	<b>Faculty of Metallurgy and Materials Science</b>
in SG issue	date	for the needs of the Department	Faculty

**The review was written by:**

<b>Prof.</b>	<b>Ph. D</b>	<b>Angel</b>	<b>Kostadinov</b>	<b>Terziev</b>	<b>TU - Sofia</b>
academic position	scientific degree	name	middle name	last name	workplace

**1. Review for the candidate:**

<b>Chief Assistant</b>	<b>Ph. D</b>	<b>Kalin</b>	<b>Simeonov</b>	<b>Krumov</b>
academic position	scientific degree	name	middle name	last name

**1.1. Completion of the provided documents:**

A) The competition documents are in full compliance with the Regulations	3 points	<b>x</b>
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B) The documents are complete but do not fully comply with the requirements of the Regulations	2 points	
C) The documents are not completed in accordance with the requirements of the Regulations	0 points	
		one of the answers given is marked with the sign "X"

<p>Missing documents and violated requirements must be described if response C is marked.</p> <p>The competition is announced for the needs of cat. "Technology of silicates" at the Faculty of Metallurgy and Materials Science at the University of Chemical Technology and Metallurgy.</p> <p>According to the announced competition for "Associate Professor" in 5.4 Energetics, the Faculty office has received documents of a single candidate: - Ch. Assistant Dr. Eng. Kalin Simeonov Krumov.</p> <p>After introduction with the competition documents, I can state that they correspond to the requirements laid down in the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria, as well as in the Regulations for the Acquisition of Scientific Degrees and the Occupancy of Academic positions in UCTM (University of Chemical Technology and Metallurgy).</p> <p>A set of personal documents (CV, diplomas, document for holding an academic position), documents reflecting the applicant's scientometric indicators, as well as those that are not relevant to the competition, but show additional commitment to the scientific research and teaching activity of the applicant, are presented.</p> <p>In order to participate in the competition, according to the Regulations for the acquisition of scientific degrees and holding academic positions at the UCTM, the candidate has submitted a document for the acquired scientific degree "Master's" in "Heating Technology" and "Doctor" degree in "Industrial Heating Technology". In addition, he has also presented a certificate for holding the academic position of "Chief Assistant" for more than 7 academic years, with three being required for participation in a competition for the position of "Associate Professor".</p> <p>A reference to the scientometric indicators is presented, and the reference is supported by properly organized evidentiary material. All tender documents are carefully designed and completed, and are submitted in both paper and electronic format. My recommendation to the applicant in future competitions is to find a way to better reference the file name and the metric of the scientometric metric to which it is applied.</p>
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### 1.2. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	x
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

<p>It must be filled in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.</p> <p>The candidate has submitted evidentiary material in relation to the minimum national requirements for holding academic position "Assoc. Prof.". Ch. assistant professor Kalin Simeonov Krumov, PhD, presented a report on the implementation of indicators 1, 4, 7, 8, 12, 14, 18 and 19, according to the Regulations for the acquisition of scientific degrees and holding academic positions at HTMU.</p>
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For the occupation of the academic position "**Associate Professor**" in the scientific field **5: Technical sciences**, in Professional direction: **5.4: Energetics**, Scientific specialty **Industrial heating Technology**, the total minimum number of points according to the required indicators is **400 points**, and the candidate claims participation in the competition with **775 points**, or exceeding the minimum requirements by almost one fold.

According to **indicator "1"**, the candidate participates with a dissertation on the topic "*Improving heat transfer in high-temperature chamber furnaces for firing ceramic products*". The results of the dissertation work have been reflected in 5 scientific papers, which do not repeat the ones presented in the competition for the "Chief Assistant" or "Assistant Professor". After a complete search in the register for academic posts and dissertations (NACID), it becomes clear that at the moment no scientometric indicators have been introduced for this indicator. The recommendation is that the scientific works from the dissertation work be submitted to the national register.

Number of points according to **indicator 1: 50 pts.**

According to **indicator "4"**, Ch. Associate Professor Kalin Krumov has presented publications equivalent to a monographic work, which are referenced and indexed in world-renowned databases with scientific information. The predominant part of scientific publications are related to numerical modeling of fuel and heat transfer processes in ceramic furnaces, as well as those related to improving energy efficiency. There are also publications related to modeling processes during the occurrence and development of a fire in a confined space. I accept the submitted publications, as well as the points claimed by the candidate for this indicator.

Number of points according to **indicator 4: 172 pts.**

According to **indicator "7"**, the candidate presents four scientific publications that are referenced and indexed in the Scopus databases. The predominant part of the publications on this indicator are closely related to the theme of the competition, and one of them analyzes the production of energy when using a renewable energy source with a daily change in the angle of photovoltaic modules. I accept the presented publications as relevant to the subject of the competition, as well as the number of points claimed by the candidate for this indicator.

Number of points according to **indicator 7: 63 pts.**

23 publications in non-refereed journals with scientific review according to **indicator "8"** are presented. The thematic directions of scientific works are related to:

- Improving the energy and technological efficiency in the operation of high-temperature ceramic furnaces;
- Analysis of heat transfer when loading different products;
- Researches on the operation of rocket engines, with a focus on the combustion process and reducing the impact on the environment.

I accept the presented publications in terms of volume and quality, as being relevant to the subject of the competition, as well as the number of points claimed by the candidate for this indicator.

Number of points according to **indicator 8: 150 pts.**

According to **indicator "12"**, the candidate presents 25 citations in scientific publications, referenced and indexed in world-renowned databases with scientific information. For citations 4, 6, 8, 17, 18 and 21, the reviewer was unable to find evidentiary material in the refereed and indexed databases (Scopus and Web of Science), finding that these citations were in refereed journals and indexed in other databases. For each of them, I accept 2 points, or a total of 12t. (reflected in indicator 14). For the remaining 18 citations, I accept the number of points claimed by the candidate.

Number of points according to **indicator 12: 180 pts.**

According to **indicator "14"**, the candidate presents 5 citations in non-refereed publications, as well as 6 in world-renowned databases other than Scopus and Web of Science.

Number of points according to **indicator 14: 22 pts.**

The candidate also presents evidentiary material according to indicators 18, 19 and 24, which are not mandatory in the competition for the employment of academic position "Assoc. Prof.". According to indicator "18" and "19", ch. Assistant Professor Kalin Krumov presents a report on his participation in 5 national scientific projects and 1 international one, as a member of the scientific team. The topic of the scientific projects corresponds to that of the announced competition, taking into account the type of tasks solved in the scientific projects, I can conclude that the candidate has significantly increased his qualifications.

Number of points according to **indicator 18 and 19: 70 pts.**

An **indicator of "24"** is also not required to occupy the academic position "Associate Prof.". Under this indicator, the applicant participated with a lab tutorial named "Guide for the design of thermal units and equipment in the silicate industry" in co-authorship. I highly appreciate the development of materials of this type, which will surely provide a higher level of education to the students. There is no doubt about the quality of the manual, given that it was developed under the critical comments and recommendations of a specialist in the field I highly respect, namely Prof. Dr. Liliana Zashkova.

Number of points according to **indicator 24: 10 pts.**

The table below presents a summary of the applicant's scientometric performance. It is clear from the table that the total number of points in Ch. Associate Professor Kalin Krumov, PhD, significantly exceeds the minimum requirement for holding academic position Assoc. Prof.

Metric type	Minimum requirements for holding Academic position "Associate Prof."	Total number of points of the applicant for holding Academic position "Associate Prof."
Indicator 1	50	50
Indicator 3 or 4	100	172
Indicator 5 up to 11	200	213
Indicator 12 up to 15	50	202
Indicator 16 to go	-	80
<b>Total</b>	<b>400</b>	<b>717</b>

In the **Scopus** database, the applicant is registered under the number 57195987786. There are 14 documents of the applicant available in the database, which have been cited a total of 20 times (to date). H – candidate index is 3.

In the **Web of Science Database**, the candidate has referenced 2 articles that have been cited a total of 22 times.

A total of 19 works of the candidate are referenced in **Google scholar**, there are 34 citations, and the h index of the candidate is 4.

In the **Research gate** database, the candidate's rating is 23.3, with 16 citations available.

Taking into account the fact that Ch. assistant professor Kalin Krumov has registered profiles in the leading scientometric databases, it can be concluded that his works have become available to the scientific community at home and abroad, and the large number of citations is evidence of the applicability of the scientific- applied results.

Considering everything said above, I can conclude that the candidate ch. Associate Professor Kalin Krumov, Ph.D., meets the minimum requirements laid down in the ZRAS and the Regulations for the acquisition of scientific degrees and holding academic positions at UCTM, for holding the academic position "Assoc. Prof." in the indicated scientific field.

### 1.3. Relevance of scientific and / or applied research:

A) The research is relevant. Part of the research is pioneering (no results are known on the topic by other authors)	7 points	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	x
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	3 points	
D) The smaller part of the research is relevant	2 points	
E) Research is not relevant	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the research must be substantiated.

After the analysis of the candidate's publication activity, the following directions in which he works can be outlined:

- Numerical modeling and simulation of heat transfer processes in furnaces, dryers and other facilities in industrial systems;
- Modeling of the processes of spreading heat and harmfulness in industrial premises, incl. and in the event of a fire;
- Analysis of heat transfer processes from solar energy through building enclosing elements;
- Research on the application of high calorific fuels for the rocket industry

Each of the directions is extremely relevant and related both to the study of heat transfer processes in various technological processes, as well as to the analysis of the possibilities for increasing energy and technological efficiency. The developed models can serve as a basis for carrying out a number of important processes for the industry. The validation of part of the results of the numerical solutions, I define as a significant contribution.

#### 1.4. Knowledge of the problems subject of research:

A) The candidate knows in detail the achievements of other authors on the researched topics and/or applications	6 points	x
B) The candidate is partially familiar with the achieved results on the researched topics and / or applications	4 points	
C) The candidate has no prior knowledge of the status of the researched problems	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.

Ch. assistant professor Kalin Krumov, , Ph.D., has been actively working on the researched issues for more than 13 years. I know the candidate's work from the presentation of research results at scientific forums at home and abroad. The skillful and precise definition of the relevant problem, as well as the selection and use of the appropriate apparatus for solving the problem, is impressive. The correct definition of the goal and the scope of tasks to achieve this goal are evidence of the knowledge of the problems in depth, incl. and similar developments by other authors. Weaknesses or omissions of authors in similar developments are pointed out, while at the same time the candidate makes proposals for solving the unresolved problems.

#### 1.5. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	
C) Theoretical with application elements	4 points	x
D) It does not correspond to the level specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

I define the type of candidate's research as scientific-applied and engineering-applied. This is due to the fact that the majority of the candidate's research is aimed at mathematical modeling and subsequent numerical research of heat transfer processes, with a view to solving real industrial problems, the end result of which is improving energy and resource efficiency given the energy-intensive industry in Bulgaria. The scientific-applied part of the developments is the creation of models for modeling heat transfer, which are validated and can be used as matrices in the modeling of analogs or the development of the specified processes.

**1.6. Objectives of the research:**

A) Realistic and of scientific and / or applied interest	8 points	x
B) Realistic, but not of scientific and / or applied interest	4 points	
C) Unattainable (unrealistic)	0 points	
		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.

I define the goals that the candidate sets for solving problems as realistic. As I mentioned above, the solution of the problems has a scientific-applied and engineering-applied character, i.e. they can be successfully used in both engineering practice and science. The solution of specific problems in the industry, in fact, is proof of the significance of the scientific research conducted, i.e. the research conducted is not only considered from a theoretical point of view. I define the numerical study of coupled heat exchange through solar permeable enclosing elements as significant with a view to increasing energy efficiency. The research conducted under operational and standard test conditions proves the adequacy of the adopted mathematical model. On this basis, prescriptions are made for choosing the type and orientation of light-transmitting elements in the building design process. The experimental tests carried out in the developments related to flying products, as well as the use of innovative ingredients and biodegradable composite materials in the above process, I define as innovative and at a high scientific level. The studies are realistic and I define the methods used as adequate.

**1.7. Methods of research:**

A) Adequate to research and set scientific objectives and /or applications	8 points	x
B) Partially appropriate, enabling part of the scientific objectives and / or applications to be achieved	4 points	
C) Inappropriate methods	0 points	
		one of the answers given is marked with the sign "X"

Methods must be specified. The type of methods used is justified.

The methods that Chief assistant professor Kalin Krumov used in solving the problems in the four directions in which he works I evaluate as correct and in harmony with the requirements of modern science and practice.

- As innovative, I would point out the creation of an algorithm, with the help of which the processes of coupled unsteady heat transfer in high-temperature furnaces, as well as heat transfer between gas media and a solid product in a furnace, are numerically modeled, especially in the part of modeling the turbulence in the gas medium.
- An approach was used in the analysis of the process of drying materials in dryers, observing the drying curves with a view to choosing the most effective drying mode with reduced energy consumption. The finite element method was used to solve the optimization problem.
- I highly appreciate the creation and subsequent validation of mathematical models for predicting heat transfer and mechanical processes in various products in the baking process. By means of them, it is possible to organize the firing process correctly, through an adequate organization of the temperature regime in the oven.
- The processes related to the occurrence and spread of fire in large halls is a serious challenge to engineering science, not only because of the significant volume, but also because of the specificity of combustible materials. Numerical modeling, adopted as a method by the candidate in solving the problem posed in this way, I define as the most significant. The results of the decision would also serve to update the legal framework.
- The conducted experimental and numerical studies on light-transmitting elements, as part of the enclosing elements of the building, "bring" a new perspective to the design of buildings;
- The methods used in the analysis of the behavior of aerial products and laid down in a number of the candidate's developments I define as appropriate and have achieved the set goals.

**1.8. Candidate research contributions:**

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	x
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.

The candidate's research contributions are in four main directions, indicated in item 1.3 of this review. I define the candidate's contributions as engineering-applied and scientific-applied contributions. Relevant contributions are presented below, with emphasis on results achieved. They are presented according to the main directions in which the candidate works:

- **Investigation of heat transfer in high temperature kilns for firing ceramics**

As **scientific-applied** contributions in the indicated direction, I accept:

- ✓ Creation of mathematical models and numerical study of the processes of coupled heat exchange in high-temperature furnaces with a focus on the firing of ceramic products;
- ✓ Validation of mathematical models for predicting thermal-mechanical firing of ceramic products;
- ✓ Creation and validation of mathematical models for processes related to convective drying of materials in industrial drying installations;
- ✓ Mathematical and numerical modeling of thermal processes in a loose layer, at different thermal loads;

<p>As <b>engineering-applied</b> contributions in the indicated direction, I accept:</p> <ul style="list-style-type: none"> <li>✓ Proposed solution for improving coupled heat exchange with a view to increasing energy, resource and technological efficiency of a high-temperature furnace;</li> <li>✓ A scheme is proposed for the way of organizing the drying regime with a view to increasing energy efficiency;</li> <li>✓ An approach has been created to change the angle of photovoltaic modules in order to increase energy production;</li> <li>✓ Determination of significant parameters influencing the spread of smoke and harmful substances in large industrial halls.</li> </ul> <p>- <b>Utilization of solar radiation through translucent elements</b></p> <p>As <b>scientific-applied</b> contributions in the indicated direction, I accept:</p> <ul style="list-style-type: none"> <li>✓ Creation of mathematical models and numerical study of coupled heat exchange under loading of flat and curved glazing.</li> </ul> <p>As <b>engineering-applied</b> contributions in the indicated direction, I accept:</p> <ul style="list-style-type: none"> <li>✓ Creation of an algorithm for motivated selection of light-transmitting elements in the construction of buildings depending on energy efficiency requirements.</li> </ul> <p>- <b>Solid rocket fuels and biodegradable composites in aviation industry</b></p> <p>As <b>scientific-applied</b> contributions in the indicated direction, I accept:</p> <ul style="list-style-type: none"> <li>✓ Numerical modeling of processes related to aviation devices, including supersonic gas flow through nozzles.</li> </ul> <p>As <b>engineering-applied</b> contributions in the indicated direction, I accept:</p> <ul style="list-style-type: none"> <li>✓ Received confirmations for the use of potassium nitrate-isomalt rocket fuel for experimental, research and other types of rockets;</li> <li>✓ Creation of ecological products with a view to significant progress of research in a number of areas of rocket science;</li> </ul>
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#### 1.9. Participation of the candidate in the achievement of the presented results:

A) The candidate has at least an equal participation in the submitted papers	8 points	x
B) The candidate has at least an equal participation in most of the submitted papers	7 points	
C) The candidate has a secondary participation in most of the submitted papers	4 points	
D) The candidate participation is unnoticeable	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items C or D is marked.

In the competition, Ch. Associate Professor Kalin Krumov, Ph.D., participated with 36 scientific publications. In about 22% of scientific works, the candidate is in first place, in about 60% in second place, which, in my opinion, is indicative of his active participation in conducting researches. There are no independent articles, which I attribute to the complexity of the researched tasks and the need for teamwork for their realization. The results of the conducted scientific research are presented personally by the candidate to scientific forums and seminars at home and abroad.

#### 1.10. Pedagogical activity:

A) The candidate has effective and sufficient pedagogical activity at the university. The textbooks issued are modern and useful (they meet the requirements of the Regulations). The work with undergraduate and doctoral students is at a high professional level.	8 points	x
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B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	
C) The pedagogical activity and / or textbooks issued are insufficient (do not meet the requirements of the Regulations)	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items B or C is marked.
The specifics of the competition do not imply the development of textbooks, as well as the guidance of doctoral students.
The candidate has held the position of Chief Assistant for more than 7 years, which implies a good pedagogical preparation. During his time as Ch. assistant in the department, he gained the necessary experience and knowledge that allowed him to take part in the development of a number of study programs (13 ) in the University Master's degree. A significant part of them are related to computer modeling, which is extremely important and necessary given the rapid pace of development of engineering science, which will provide the necessary basis for training engineering personnel at a high level, according to business needs.
Part of the process of building a teacher is his work with students. Ch. Associate Professor Kalim Krumov, Ph.D., was the thesis supervisor of 5 graduates in Master's degree. The candidate's work on 6 NIS projects at UCTM significantly increased his professional qualifications and contributed to his development as a researcher.
A certificate has been submitted by the candidate for the lecture courses that will be held under the presented competition for the appointment of "Associate Professor" academic position. The candidate will be engaged in the delivery of lecture courses in two bachelor's and four master's courses, with the focus of the master's courses being computer modeling and simulation of various processes.
Although Indicator 24 of the scientometric ones is not required for holding academic position "Assoc. Prof", the candidate participated in the competition with " <i>Manual for the design of thermal units and equipment in the silicate industry</i> " in co-authorship. I appreciate the development of learning materials and tools with interactive content.
In conclusion, I highly appreciate the pedagogical activity of the candidate.

#### 1.11. Critical notes:

A) Lack of critical notes	8 points	x
B) Critical notes of a technical nature	7 points	
C) Critical notes that would partially improve the results achieved in a small part of the research	5 points	
D) Critical notes that would partially improve the results achieved in most of the research	3 points	
E) Significant critical notes	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the answers C, D or E is marked.

The applicant has registered profiles in the widely available databases, and my recommendation is to direct the significant research results to journals with a high impact factor (rank) or in Q1 and Q2, which will inevitably increase the dissemination of the results.

In addition, I would suggest the applicant to expand the existing expert group with the inclusion of young researchers, PhD students and students. I also strongly recommend increasing the number of contractual tasks at the national and international level, as well as strengthening business ties.

#### 1.12. Conclusion

A) The evaluation of the candidate's activity is <b>POSITIVE</b>	This evaluation is assigned to a total number of at least 65 points	X 94 pts.
B) The evaluation of the candidate's activity is <b>NEGATIVE</b>	This evaluation is assigned to a total number below 65 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the reviewer

Taking into account the scientometric indicators of the candidate, the comments on the quality and quantity of the scientific production, the participation of the candidate in the educational and research process, as well as observing the ZRAS and the rules of the UCTM, I confidently suggest **Ch. Assistant Dr. Eng. Kalin Simeonov Krumov** to occupy the academic position of "**Assoc. Professor**" in the scientific specialty "**Industrial Heating Technology**" in professional direction **5.4. Energetics** and scientific field **5. Technical sciences**.

<b>21.11.2023</b>	The review was written by:	
date		signature