

# OPINION

submitted by prof. Konstantin Ivanov Hadjiivanov  
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(member of the scientific jury)

on the dissertation of Prof. Dr. **Yuri Angelov Kalvachev**  
Full Professor at the Institute of Catalysis of the Bulgarian Academy of Sciences,  
Entitled "*Synthesis and Properties of Zeolite Catalysts*",  
submitted for obtaining the scientific degree  
"Doctor of Chemical Sciences"

## I. Documents submitted

For the defence of the dissertation for the award of the scientific degree Doctor of Chemical Sciences Prof. Kalvachev represented the following documents, required by law: (i) dissertation, (ii) abstract, (iii) diplomas for higher education, for obtaining the scientific-educational degree doctor PhD and for acquiring the academic position of professor (iv) scientific CV, (v) record of the session of the Colloquium of the Institute of Catalysis, as well as (vi) copies of the scientific papers included in the dissertation.

## II. General data for the dissertation

The dissertation of Prof. Kalvachev covers 146 non-standard pages and the results are adequately reflected in the abstract. The research work has been conducted on a high scientific level both in Bulgaria and in other countries such as Japan and Germany, the latter being known for the care of the government for the development of science. The topic of the dissertation is significant and it is related to a number of scientific fields.

The work is devoted to the synthesis and catalytic properties of materials having zeolite structure. The influence of the structure, the particle size, the chemical composition and the modification ways on the catalytic properties have been studied in details. In particular, the author studies five groups of materials (i) classical zeolites possessing hierarchical structure, (ii) gold deposited on titanosilicates, (iii) zirconosilicates and zirconium-modified zeolites, (iv) zeolites synthesized using coal ash and (v) zeolite-polymer films.

I will not dwell in detail upon the separate scientific achievements that are well systematized by the author. I would just like to point out that the most recent works, included in the dissertation, those focused on the catalytic properties of deposited gold catalysts, have already stood the test of time and have been highly praised by the scientific community.

### **III. Scientometric indicators**

The scientific publications, included in the dissertation, are a total of 27 in total and they are distributed as follows:

**A.** One book chapter published by the renowned international publisher Springer.

**B.** Eighteen articles in journals having impact factor. Half of these scientific papers were published in Q1 journals according to Scimago, as follows: one article each in the journals Applied Catalysis B - Environmental (IF = 16.683); Journal of Catalysis (IF = 7,545), Crystal Growth & Design (IF = 4,089), Microporous and Mesoporous Materials (IF = 4,551); Catalysis Communications (IF = 3.612) and Materials Letters (IF = 3.204) and three articles in the Journal of Materials Science (IF = 3.553). Some other five papers have been published in journals of category Q2 (Catalysts, Journal of Thermal Analysis and Calorimetry, High Performance Polymers, Journal of Drug Delivery Science and Technology and Studies in the Surface Science and Catalysis) and four articles in Bulgarian journals of lower category.

The relatively low number of co-authors in the main part of the works makes a good impression, as the average value is 3.3. It should be emphasized that in more than half of these works Prof. Kalvachev is either the first author or he is noted as the main author (author for correspondence). This testifies to the significant contribution and/or his leading role in the research.

**C.** Three patents issued in Japan, USA and Bulgaria.

**D.** Four articles in non-impact factor sources, three of which were in books published by Heron Press, and one as conference proceedings.

The total number of articles satisfies the recommended criteria, adopted by Rules of the Institute of Catalysis for obtaining the scientific degree of Doctor of Sciences. These indicators definitely exceed the national criteria.

**E.** A list of 58 participations in scientific forums, reflecting the results of the dissertation, is also represented.

**E.** The author represented a list of 273 independent citations on the scientific papers, included in the dissertation. This exceeds the recommended criteria of the Institute of Catalysis. I randomly reviewed the nature of several citations and found out that they were positive.

#### **IV. Remarks and recommendations**

I have no significant remarks on the dissertation. I would only note that one of the patents is in Japanese and it probably overlaps to some extent with the US patent. Even if there is an overlap, it does not affect my general conclusions.

#### **V. Relation to the dissertation for obtaining the scientific-educational degree doctor**

There is no overlapping between the current dissertation and the dissertation for obtaining the scientific-educational PhD degree of doctor. The diploma for the degree of Philosophy Doctor is dated back to 1993, while the earliest work included in the present dissertation is from 1997.

#### **VI. Personal impressions**

I know Dr. Kalvachev as a colleague working at the Bulgarian Academy of Sciences. Although not in-depth, my impressions are definitely positive. The total scientific production of Dr. Kalvachev also makes a positive impression - 56 scientific articles, cited more than 800 times (H-index = 15).

#### **CONCLUSION:**

**Considering the scientific contributions of Dr. Kalvachev, as well as the recommended criteria of Institute of Catalysis, I am convinced to vote for awarding the scientific degree of Doctor of Chemical Sciences to Assoc. Prof. Dr. Yuri Angelov Kalvachev.**

May 31, 2021

Signature:

/prof. Konstantin Hadjiivanov/