

OPINION

By Assoc. Prof. Dr. Velin Nikolov,

member of the scientific competition jury for academic position "professor" in the professional field 4.2 Chemistry (Inorganic chemistry) for the needs of laboratory "Intermetallics and intercalation materials" at IGIC-BAS, published in the State Gazette no. 36 of 03.05. 2019

In this competition has appeared only one candidate -Assoc. Prof. Violeta Koleva.

In 1984, Koleva graduated from the Sofia University as a master in "Inorganic and Analytical Chemistry". In 1993 she finished PhD thesis as a PhD student at the UCTM. Since 1994 until now Koleva is a researcher at IGIC-BAS, and since 2007 she is Associate Professor. Koleva has 34 years of experience, and during all these years the main activity is in the field of synthesis and characterization of inorganic materials.

Scientific indicators

Before all, Koleva is autor of 77 scientific papers in reputable journals, and her papers have 822 citations. Only these two figures are already enough. An average of about 3 publications per year in an area where research begins with synthesis, goes through a variety of methods of structural and chemical characterization and ends with a study of application properties is a very good result. Even more impressive is the average number of citations- over 10 per publication. In addition, Koleva has participated in 19 research projects, of which 3 were manager. He was also head of three successfully finished PhDs.

According to the requirements of BAS and IGIC, the candidate for academic position "professor" should have a total of 760 points. Koleva provides proof of 2360 points (3 times more), and in each of the indicators it exceeds the requirements. The number of quotes is 9 times the required.

Contributions in the frame of the habilitation work

Koleva has provided 15 scientific papers on the subject of research – lithium (sodium) transition- metal phosphates as well as their potential applications - ion battery electrodes. It is impossible in the frame of short opinion to describe and discuss all scientific impact of this research, but the in general they look like as follow;

1. syntheses. Two new methods have been developed - Phosphate-formiate one and the use of appropriate precursors as the second. As a result, a number of olivine phosphates are synthesized, characterized by very high phase purity, homogeneity, low synthesis temperatures and reproducibility. It is particularly important that the obtained olivines are with desired structural and morphological characteristics. Solid solutions have been successfully synthesized among the main representatives with improved application properties.

2. spectral characterization of the products. By X-ray, IR and EPR analyzes the obtained products are thoroughly investigated and important information about the phase purity, the local distribution of ions, the microstresses, into the structure are established. The data being

analyzed and closely related to the synthesis conditions-concentration of the solutions, temperature, etc. Most of the results were reported for the first time.

3. morphology. By the SEM and TEM analyzes the morphology of the products - size of the particles, size distribution, structural orientation and so on was studied. Again all these features are related to the syntheses conditions. An important effect is the carbon on the surface, which improves the electrical properties of the samples.

4 electrochemical measurements. As a result of these measurements one particularly important result is obtained - the electrochemical activity of the phosphate-olivines is a direct consequence of the stable and pure olivine structure and proper particle morphology. In each of the publications there is a logical course of synthesis through structural and morphological characterization to electrochemical properties. Each of these elements brings undoubted inputs and all together bring new inputs as the end result. Undoubtedly, the developed methods and approach are, in general, a wonderful basis for future research on other materials.

Contributions outside of habilitation work

In this framework, the candidate presents 26 scientific papers. 16 of these relate to the vibration characteristics of metal phosphate crystalline hydrate salts. Raman and IR analyzes were used for the first time at low temperatures. This in itself determines the obtaining of pure spectra not influenced by temperature fluctuations. The study of a class of structure-like compounds has made it possible to elucidate important relationships between the nature of the metal ion and the displacement in the spectra. It is associated with the metal strength of the metal -oxygen and phosphate-oxygen bonds. The new obtained data is not only important impact to the investigated compounds but are extremely useful as a basis for future research. The remaining 10 papers refer to thin films nickel capacitors.

Looking at the scientific work of Associate Professor Violeta Koleva I conclude that they are an example of clever planning, persistent and systematic research, and in-depth analysis of results. In addition to concrete contributions, these studies have the potential for promising future developments.

Conclusion

taking into account the scientific parameters of Assoc. Prof. Violeta Koleva, the scientific contributions reflected in the works of habilitation, the contributions reflected in the non-habilitation works, as well as my personal excellent impressions from Koleva as a researcher, **I strongly recommend that it be approved for an academic position " professor "for the needs of the laboratory" Intermetallics and intercalation materials "**.

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