R E V I E W

on the competition for the academic position Associate Professor scientific direction 4.2. Chemical Sciences (Inorganic Chemistry)

at the Sofia University "St. Kliment Ohridski" – Faculty of Chemistry and Pharmacy (SU-FCP)
announcement in ДВ, No 21, 13.03. 2020

Applicant: **Assistant Prof. Dr. Martin Petrov Tsvetkov** (SU-FCP)

Member of the Scientific Jury: Prof. Dr. Radostina Konstantinova Stoyanova (IGIC-BAS)

A. Report on the fulfilment of the minimal criteria of SU-FCP

In the competition for associate professor on inorganic chemistry Dr. Tsvetkov participated with a habilitation thesis based on 5 scientific publications devoted mainly to the study of photocatalytic processes for water purification. It is of importance that 3 of these articles were accepted in international journals from the first quartile in field of chemistry, materials science and catalysis. Along with them, Dr. Tsvetkov presents 14 scientific publications focusing on the application of ferrites as photocatalysts. All publications are in journals with impact factor, as 12 of them (i.e. 85.7%) are published in journals classified outside the first 25% of the respective field, as follows 28.6% in Q2, 21.4% in Q3 and 35.7% in Q4. Dr. Tsvetkov's articles have so far received 50 independent citations, 22 of them are only on one publication that is outside of habilitation work. Dr. Tsvetkov has participated in seven projects funded by the programs of Sofia University and the National Science Foundation, 4 of which he is a leader, and three - a participant. The Hirsch index (H-factor) of the overall scientific output of Dr. Tsvetkov is 4 (SCOPUS database).

In addition to research, Dr. Tsvetkov participates in the teaching activities of the Department of Inorganic Chemistry at SU-FCP. Since 2019, he has been leading the course "General Chemistry" for the specialty "Teacher of Natural Sciences" at the Faculty of Physics and the course "Methods for characterization of substances and materials" (X-ray analysis) for the master's program "Inorganic hybrid materials for advanced technologies", as well as exercises and seminars on the courses "General Chemistry" and "Inorganic Chemistry". He is the supervisor of 15 course works for the specialty "Chemistry" in "Teaching practice in inorganic chemistry".

The report analysis reveals that Dr. Tsvetkov's scientific output covers the subject of the competition and meets the minimal national requirements for occupation of the academic position of associate professor in the field of Natural Sciences, Mathematics and Informatics, Direction of Chemical Sciences, mentioned in The Law for the Development of the Academic Staff in Bulgaria, the Regulations for its Implementation and the Rules for the Conditions and

Procedures for Acquisition of Academic Degrees and Occupation of Academic Positions at SU-FCP.

B. General features of the applicant's research activities

B1. Main scientific contributions presented in the habilitation thesis. Research on oxidation processes involving hydroxide radicals has a direct impact to the development of modern technologies for the water purification. This is the research area covered by the habilitation work of Dr. Tsvetkov, entitled "Advaced oxidation processes to remove organic pollutants in water." The main contributions of Dr. Tsvetkov are related to the preparation, structural characterization (mainly by X-ray diffraction) and photocatalytic properties determined under light irradiation. The subjects of study are 3D mesoporous composites of transition metal oxides (such as CuO, NiO) with g-C_3N_4, which show a synergistic effect on the individual components due to the developed microcontacts between them. Furthermore, ferrites modified with silver nanoparticles and TiO_2 (commercial product Degussa P25) irradiated with γ-rays were also used as photocatalysts. These materials display improved photocatalytic performances in the decomposition of toxic dyes. It is worth to mention that this topic is developed by the candidate after the defense of his dissertation.

B2. Scientific contributions presented in the non-habilitation thesis. These studies are mainly focused on structural modification of ferrite materials as photocatalysts for water purification from organic pollutants. One of the approaches comprises structural modification by addition of lanthanide ions to oxides such as zirconium tungstate and ferrite. The information from these studies is of significance in order to go inside into structural features of the modified materials and to correlate with their photocatalytic properties. These studies were carried out in a team composed mainly of scientists from IC-BAS. The role of Dr. Tsvetkov consists in performing the structural characterization of the catalysts by X-ray diffraction, as well as in carrying out photocatalytic experiments.

C. Recommendations

Dr. Tsvetkov's research is mainly focused on synthesis and structural characterization of composite materials and determining their photocatalytic properties. This is an advanced and competitive research topic. In this respect, the future research activity of Dr. Tsvetkov could be developed at the next level if new approaches for selection of photocatalytic materials (single components or composites) and their modification are introduced.

D. Conclusion

The research of Dr. Tsvetkov presents new data on the photocatalytic properties of composite materials between oxides and polymers with semiconductor properties. In addition, Dr. Tsvetkov has a teaching activity at the Department of Inorganic Chemistry at SU-FCP. Based on the overall research and teaching activities, I propose to the Scientific Jury to award Assistant Professor Dr. Martin Tsvetkov the academic position of "Associate Professor" of

Inorganic Chemistry at the Faculty of Chemistry and Pharmacy at the Sofia University "St. Kliment Ohridski”.

20.08.2020 г. Radostina Stoyanova