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Tuesday, 06 November 2018

Re: Review of foreign Ph.D. supervisor

Ph.D. thesis review of by foreign Ph.D. supervisor Professor Yitzhak Mastai for the Ph.D. thesis of Imangaliyeva Ainur Nuralikyzy titled "*Sorption and catalytic characteristics of composite materials based on natural raw materials*" provided for the degree of Doctor of Philosophy Ph.D. in specialty "6D072000- Chemical technology of inorganic substances".

Composite material (CM) is a material consisting of two or more components (phases), where one of them, at least, is a solid, with a special property that cannot be achieved by any of the components separately or even not just their sum. The properties of composite materials are accomplish through the interaction of individual phases, called the synergistic effect. Composite materials are widely used in medicine, construction, shipbuilding, sorption, catalysis, as well as in many other branches of science and technology. In this regard, the synthesis and study of the properties of composite materials have theoretical and practical interest.

Thus, synthesis cost-effective composite materials based on natural raw materials with high sorption capacity for heavy metal ions from aqueous solutions and high catalytic activity is very important. The scientific novelty of the research of this Ph.D. dissertation is the development of optimal conditions for the synthesis of new polymer-inorganic composite materials. In this work for the first time, it demonstrated the possibility of applying the obtained CM in water purification process from heavy metal ions by sorption method.

In addition, the newly synthesized copper-containing CMs were studied as catalysts in the reactions of hydrogenation of 4-nitrophenol and oxidation of yellow phosphorus.

In the course of this dissertation, modern research methods were applied such as X-ray diffraction (XRD), high-resolution scanning electron microscopy (HR-SEM), energy dispersive X-ray spectroscopy (EDX), Brunauer-Emmet-Teller (BET) surface area analysis, atomic absorption

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spectroscopy (AAS), UV-visible spectroscopy analysis and chemical methods. Therefore, the reliability of the results are not in doubt.

Imangaliyeva Ainur proved to be a thoughtful and responsible researcher. During her studies, she visited Israel (Bar-Ilan University) three times for few months to perform experiments under my guidance. These visits provided with fruitful results for her research, and she was awarded with a scholarship from Bar-Ilan University for conscientious and hard work. Within this period, we co-wrote two articles: the first regarding in situ synthesis of Cu_2O nanocomposites based on clay materials – polyethylene glycol and their catalytic characterization for 4-nitrophenol reduction. The second; paper titled "Bentonite Polymer Composite for Water Purification. Moreover, the abstract of this paper was published at the International conference "Chemical technology of functional materials", where her work took 1^{st} place.

Overall the Ph.D. thesis of Imangaliyeva Ainur Nuralikyzy represents a great deal of work. The results are well presented and their interpretation is at a high scientific level. I really appreciate the candidate expertise in the field of materials characterization and catalysts testing. The research it describes is of the international standard. This thesis is ready to be defended orally and certainly, meets the requirements for the degree of Ph.D. in chemistry.

Professor Yitzhak Mastai

Yitzhak Mastai

Foreign scientific supervisor

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