DISSERTATION THESIS TITLE:

SYNTHESIS OF HYDROXYAPATITE NANOFIBERS FOR TARGETED DRUG DELIVERY

REVIEW

Scientific supervisor, doctor of Inorganic Chemistry, professor Salavati Niasar M. for the dissertation work of Mohammad Shams, "Synthesis of Hydroxyapatite nanofibers for targeted drug delivery", submitted for the degree of Doctor of Philosophy (Ph.D.) in the specialty 8D07113 - "Nanomaterials and Nanotechnologies in Chemistry."

The mentioned Ph.D. candidate has studied the synthesis of different bioceramics (Hydroxyapatite and Calcium pyrophosphate) to use in bone tissue regeneration. In parallel, he investigates the synthesizing of biodegradable resin and resin reinforcement precursors using the sonochemical method, which shows the promise of using this method for obtaining biodegradable scaffolds for tissue engineering as osteogenesis enhancement agents. In addition, the physicochemical and mechanical properties of the obtained powders, surface morphology, phase analysis, specific surface area, and porosity were studied.

The Ph.D. candidate results show that to address biological needs, achieving the required mechanical function and mass transport qualities, the developed parametric design algorithms can generate hierarchical porous structures and create these structures within arbitrary and complicated 3D anatomical geometries that result in porous scaffolds with a controllable shape, pore distribution, size, and interconnectivity. Due to the links that can be established between geometric features made possible by the developed algorithms, the model's shape changes whenever a dimension value changes. These findings can reduce the cost of bone scaffold production and increase their reliability.

Shams M. passed foreign practice at the University of Kashan (Kashan, Iran), and in collaboration with the Institute of Nano Science and Nano Technology, during his internship, he gained good experience in synthesizing nanoparticles with soft magnetic properties.

One of the main goals of medicine is to decrease the period of convalescence. Therefore, producing biodegradable scaffolds by 3D printing, which can absorb over time, can significantly change this field, and Shams M. could overcome all challenges with his perseverance and independence.

In the dissertation work of Shams M., various mechanical tests are done on models to ensure their strength under real conditions. For example, the calculations carried out by the doctoral student showed that the porosity of scaffolds accelerates the delivery of nutrients and growth cells and can release the drugs over time.

The published articles can be mentioned as evidence of the high quality of the work done. The main provisions of the dissertation are reflected in seven published works, including three articles in journals with a non-zero impact factor included in the Scopus database, as well as three abstracts in the materials of international and foreign scientific conferences and symposiums.

According to the main features, the relevance of the problem, the novelty of the results obtained, their validity and reliability, the amount of research, and practical significance, The dissertation work of Shams M., "3D printing of hydroxyapatite as a drug delivery agent in bone refining", submitted for the Ph.D. degree, is a scientific work that has a promising direction for the development of the processes of obtaining and researching nanomaterials in bone regeneration in general. The doctoral student deserves to be awarded a Ph.D. in the specialty 8D07113 - "Nanomaterials and Nanotechnologies in Chemistry."

Scientific supervisor,
Sincerely Yours,

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