

BOOK SERIES - 50th Year of Hacettepe University
Series Editor: Adil Denizli

PARTICULATE TECHNOLOGY AND APPLICATIONS

***Ali Tuncel
Handan Yavuz
Editors***



**HACETTEPE
UNIVERSITY
2018**

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PREFACE

We have proudly celebrated the 50th anniversary of the foundation of Hacettepe University. We take pride in being one of the most successful universities in Turkey and being ranked among the leading universities in the World. Since the year 1967, when Hacettepe earned the status of 'University', it has never given up on its principle of continuously going ahead and reaching for the very best. Hacettepe, always preserving its values and basic principles, has become a pioneer university that has been intertwined with the society and pursued innovations, achieving many "firsts" ahead of others.

From medicine to biology, philosophy, statistics, physics and chemistry; from history of arts to the English, German and French languages; from sociology to engineering, fine arts and conservatory, Hacettepe University started almost 50 years ago developing interdisciplinary collaborations across a wide range of scientific fields, a research trend which has achieved a status of global recognition in the 21st century.

Hacettepe University, which was recognized as "Research University" by the decision of Council of Higher Education, dated September 26, 2017, has built a strong "brand" image over these 50 years with its qualified and unique contributions to science in Turkey and has been the country's gateway to global scientific advances. It has graduated tens of thousands of students, each of whom has been our source of pride with their contributions to science, society and humanity as well as with their worldwide achievements. So have its graduates always been proud of Hacettepe.

Hacettepe University owes its success to its people who have always aimed to move forward by promoting interdisciplinarity and without giving up on the understanding "To the leading edge... Toward being the best..."

The Turkish and English series of books you are presented have been prepared in memory of the 50th anniversary of Hacettepe University by Prof. Dr. Adil Denizli, a distinguished researcher and faculty member who has heartily devoted himself to his university and science. Among the editors and authors of

the book series are respected scientists from Hacettepe University, Turkey and abroad. The series covers the studies from the multi-/interdisciplinary research areas of sciences, mainly from Medicine, Science and Engineering Sciences, which particularly stand out among the World's and Hacettepe's research interests.

Readers benefiting from these books will certainly appreciate the value of the profound contributions Hacettepe University made to science both in the country and in the World each time they see the name of "Hacettepe University" in the context of the authors, editors, footnotes, citations and bibliographies. This work is an expression of respect for Hacettepe University and for those who have meticulously served in this university for 50 years with an interdisciplinary understanding.

Thank you Adil Denizli... I would like to express my sincere gratitude and thanks to all those who have contributed to this precious work.

I wish many 50 more years to go forward in line with our motto "To the leading edge..... Toward being the best..."

Prof. Dr. A. Haluk ÖZEN
Rector

PREFACE

In 1954 “Hacettepe” was founded in two chambers of an old Ankara house as a Chair of Child Health, then in 1967 officially earned “university” status. Hacettepe University celebrated its 50th anniversary in 2017 by proud of rich heritage and the positive, life-changing impact globally through the strength of our research, teaching, innovation and enterprise. In just 50 years Hacettepe University has managed to forge a powerful global reputation as a strong research-led university. To celebrate 50th anniversary numerous standout events were planned and performed by proud of past and dreaming of the future.

The Hacettepe Book Series are published to honor the five decades of work not only for the field but also for society at large and to leave the scientific mark of Hacettepe University to the history.

Prof. Dr. Adil DENİZLİ
Series Editor

PREFACE

Particle technology term is generally used to refer science and technology related to the preparation and processing of particles and powders. Although particle technology covers a broad group as the liquid drops, emulsions and bubbles as well as solid particles, this book only covers solid particles.

The objective of this book is to combine the knowledge of the processing and handling of particles. The topics included have been selected to cover monodisperse-polymer particles, silica nano and micro particles, biodegradable micro and nanoparticles, magnetic iron-oxide nanoparticles, nanocomposites and nanofibers, magnetic polymeric particles and metal nanoparticles, which are thought to find broad applications in biomaterials area. The coverage of each topic is intended to be exemplary rather than exhaustive. Although the primary target readership is amongst chemists and chemical engineers, the material included form the basis of information on particle technology for scientists and students from other disciplines including mechanical engineering, civil engineering, applied chemistry, pharmaceuticals, metallurgy and minerals engineering, as well.

Prof. Dr. Ali TUNCEL
Prof. Dr. Handan YAVUZ
Editors

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Dr. Ali Tuncel graduated from Hacettepe University, Chemical Engineering Department in 1984. He completed his Ph.D. Thesis on the "synthesis of polymeric nanoparticles by emulsion polymerization" in 1989 in the same university. He was a visiting researcher in Cambridge University, Institute of Biotechnology in 1991. Dr. Tuncel started in Hacettepe University, Chemical Engineering Department as a faculty member in 1990. He became a full professor in Chemical Engineering in 1999. His research area is on the synthesis of monodisperse nanoparticles/microspheres and their applications in nanotechnology, nanomedicine and nanobiotechnology. He is the author of more than 150 articles published in peer-reviewed journals indexed by SCI. Dr. Tuncel is the full-member of Turkish Academy of Sciences (TÜBA) since 1999. He has the TÜBİTAK Encouragement Award in Science and Hacettepe University Science Award (1998).

Dr. Handan Yavuz was born on 1975 in Kayseri, Turkey. She has achieved her Ph.D. in 2003 from Hacettepe University on the subject of 'Cholesterol removal from hypercholesterolemic human plasma by immunoaffinity adsorbents'. She has started her present position in 2014 as a Professor at Department of Chemistry, Hacettepe University. Her main research areas are the production of polymers having different surface and bulk properties, shape and geometries and applications of these polymers; hemoperfusion-removal of toxic materials (bilirubin, pathogenic antibodies, cholesterol, metal ions such as iron, mercury, aluminum and cadmium) from blood; interaction of enzymes and proteins with polymeric surfaces, preparation of polymer based bio-specific sorbents, purification of enzymes and proteins by chromatographic methods (affinity chromatography, hydrophobic chromatography, dye and membrane affinity chromatography, immobilized metal chelate affinity chromatography etc.); preparation of molecular imprinted polymers for specific recognition of proteins, amino acids, metal ions etc. and preparation of nanoparticles and their sensor applications in quartz crystal microbalance and surface plasmon resonance systems.