## Biography

## WAEL MAMDOUH

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***Leader, Biomedical Polymer Nanocomposites, Hydrogels, and Tissue Engineering*** ***Group***   
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Dr. Wael Mamdouh is a “Professor of Nanotechnology” at the Department of Chemistry, School of Science and Engineering at the American University in Cairo (AUC). He is also the head of the research team for “Biomedical polymer Nanocomposites, Hydrogels, and Tissue Engineering” at AUC since 2011.

**Education**

Dr. Mamdouh received his M.Sc. and Ph.D. degrees in Chemistry and Nanotechnology from the Katholieke Universiteit Leuven (KUL) in Belgium (one of the top 40 worldwide) in 2002 and 2005 respectively, and B.Sc. degree in Science: Chemistry from Ain Shams University, Egypt in 1997.

**Courses**

Dr. Mamdouh teaches a wide range of scientific curricula in the fields of general chemistry, general science and nanotechnology for undergraduate and graduate students.

**Student supervision**

Dr. Mamdouh supervised many scientific and research theses for undergraduate, masters and doctoral students at AUC, and also in co-supervision with national universities such as faculties of science, pharmacy, dentistry and agriculture at Cairo and Ain Shams Universities as well as the Egyptian Atomic Energy Authority.

In addition, the research team headed by Dr. Mamdouh is considered the most diverse in the field of nanotechnology globally, as it includes a distinguished group of students and researchers in different backgrounds in the fields of chemistry, biology, biotechnology, mechanical engineering, dentistry and pharmacy.

Around 40 students (undergraduate, M.Sc. and Ph.D.) graduated under Mamdouh’s supervision since 2014, which is one of the highest records. Many of those students further developed their careers abroad (PhD studies) in USA, UK, Switzerland, Germany and France.

**International collaboration**

Dr Mamdouh has a number of joint scientific cooperation with the most prestigious European, American and Asian universities in the fields of cancer, antimicrobial systems and Food packaging.

**Research interests**

The current scientific research of the research team led by Dr. Mamdouh is focused on: (a) Developing integrated polymeric compounds, nanoparticles and fibers with unique properties, studying their different properties, and using them as highly accurate drug nanocarriers in the field of various diseases and nano cosmetics, (b) developing antibacterial nano-wound dressings, (c) bone/tissue growth engineering, (d) developing membranes designed in ways that allow the degree of porosity and filtration to be controlled and used in biomedical, filtration and packaging applications.

For more than 20 years, Dr. Mamdouh has built up significant research experience in the field of nanoscience and nanotechnology where he was engaged in performing state-of-the-art nanoscience and nanotechnology research in a multidisciplinary research environment across many scientific fields such as chemistry, physics, biology, material science, and surface science.

Dr. Mamdouh used in his research a wide variety of nanomaterials ranging from core-shell silver nanoparticles, nanofibers, DNA/RNA nucleobase molecules, modified nucleobases, peptide nucleic acids, locked nucleic acids, amino acids, carbon nanotubes, enzymes, proteins, chromosomes, and DNA origami.

Dr. Mamdouh’s research work is divided into four main parts:

1. Designing novel nanomaterials and nanocomposites - electrospun nanofibers and conjugated nanoparticles - for biomedical, industrial and packaging applications using natural and synthetic polymers, herbal extracts and essential oils.
2. Investigating different biomedical activities (such as antibacterial, drug delivery, antioxidant, and cell proliferation) of the developed nanomaterials
3. Applications of the prepared nanomaterials in

* Drug delivery (for cancers like breast and lung) and neurodegenerative diseases (Alzehimer)
* Antibacterial and antifungal nano-coatings
* Nanofibers scaffolds for wound dressings
* Nanofibers scaffolds for tissue engineering (including bone, cartridge, tissue and skin regeneration), and Nanodentistry
* Nanofibers scaffolds for Nano-cosmetics,
* Nanoporous membranes for biomedical, industrial and packaging applications.
* Converting food waste into useful nanomaterials in different forms (nanofibers and nanoparticles), with enhanced biomedical applications

1. Instruments development: Dr. Mamdouh is interested in building scientific instruments such as Electrospinning techniques which are cost-effective, reliable, robust and user friendly, in addition to biomedical kits

**Founder of a Startup**

Dr. Mamdouh is the CEO and Founder of a recent Spinoff Company (NANOFibTECH) for producing innovative nanotechnology-based antibacterial and disinfectant liquids and skincare solutions for healthcare industry – From the lab to the market. The project led to this startup was initially funded by AUC followed by series of funding received from the Academy of Scientific Research & Technology (ASRT) in Egypt. NANOFiBTECH was incubated in collaboration with Bedaya Center for Entrepreneurship & SMEs Development (GAFI), Ministry of Investments in Egypt for 9 months in 2016 through National Incubation program (INTILAQ). Following that, NANOFiBTECH won the first place prize among 200 participants for the best startup in the 3rd Cairo International Exhibition of Innovation (Cairo Innovates 2016), organized by ASRT in Egypt. At the beginning of the COVID-19 pandemic, in 2020 Dr. Mamdouh won another national competition “Ideation Fund” and received funding for developing novel eco-friendly disinfectants against COVID-19 from ASRT. In 2020-2021, NANOFiBTECH won the prestigious NINJA business plan competition organized by the Japanese Agency of International Cooperation Egypt Office (JICA) as a promising emerging startup in Egypt, that not only provide prescriptive solutions to the current Pandemic but also respond to the expected radical changes in post-Pandemic socio-economic reality.

**Publications**

Dr. Mamdouh published around 65 papers in international peer-reviewed journals such as Nature, Nature Nanotechnology, Scientific Reports, International Journal of Pharmaceutics, ACS NANO, Journal of the American Chemical Society, Journal of Physical Chemistry and many more, in addition to two book reviews and conference proceedings and his publications received more than 4000 citations worldwide. Mamdouh’s work has been presented at many different universities and specialized conferences where he has been invited to lecture and chair sessions at many national, international conferences, workshops and universities in Europe, China, United States and Egypt.

**Selected publications**

[1] [Wisam Khalaf Delan, Isra Ali, Mai Zakaria, Basma Elsaadany, Ahmed R. Fares, Aliaa N. ElMeshad, Wael Mamdouh\*. *Investigating the bone regeneration activity of PVA nanofibers scaffolds loaded with simvastatin/chitosan nanoparticles in an induced bone defect rabbit model.* International Journal of Biological Macromolecules 222, 2399-2413](mailto:https://pubmed.ncbi.nlm.nih.gov/36220413/?subject=https://pubmed.ncbi.nlm.nih.gov/36220413/)

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[9] [Wisam Khalaf Delan, Basma Elsaadany, Ahmed R. Fares, Aliaa N. ElMeshad, Wael Mamdouh, and Mai Zakaria\*. *“Histomorphometric analysis of bone formation after using simvastatin chitosan nanoparticles as a local delivery system in periodontal bony defects in rabbits”.* Advanced Dental Journal, 2021, 3 (3), 109-120](mailto:https://adjc.journals.ekb.eg/article_184694.html)

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**Patents**

Dr. Mamdouh recently registered several patent applications in the United States of America, related to: (a) the development of conjugated nanoparticles and compounds (Nanoparticle-based Combinatorial Therapy) for the treatment of breast cancer. (b) Nanofibers for Antibacterial and Prebiotic applications for the development of antibacterial nano-wound dressings that help treat colon and digestive disorder problems at the same time. (c) Manufacture of medical disinfectants made of nanocapsules made of natural materials and essential oils with a superior ability to prevent the accumulation of bacteria and germs on different surfaces.