

Curriculum Vitae

Dr. Mohamed Mounir Fathallah Elsutohy

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Qualifications:

- 2013-2016 **PhD Pharmacy**, University of Nottingham, UK (Funded by the University of Nottingham and the Islamic Development Bank); thesis title: Development of fluorescent nanosensors for real-time biological assays.
- 2008-2011 **MSc Pharmaceutical Sciences** (Pharmaceutical Analytical Chemistry), University of Assiut, Egypt; thesis title: Analysis of some angiotensin II receptor antagonists in pure forms and in pharmaceutical preparations.
- 2001-2006 **BSc Pharmaceutical Sciences**, Al-Azhar Univeristy, Assiut, Egypt (Excellent with degree of honour)

Employment History:

- Septemr2016-current **Post-doc Researcher in Analytical Bioscience**, School of Pharmacy, University of Nottingham, UK. Project aims to develop end-user biosensors/nanosensors for in-home diagnosis of selected infectious diseases and viral infection
- March2016-Current **EPSRC Bridging the Gap Research Associate in Analytical Bioscience**, School of Pharmacy, University of Nottingham, UK; Project aimed to develop desktop viral diagnostics for the consumer market in collaboration with an industrial partner (TBG Solutions), UK Governmental funded project.
- December2011-current **Assistant Lecturer**, Pharmaceutical Analytical Chemistry Department, Al-Azhar University, Assiut, Egypt
- August2007-Novemer 2011 **Senior Instructor**, Pharmaceutical Analytical Chemistry Department, Al-Azhar University, Assiut, Egypt
- March2008-October2008 **Medical Representative** in Julphar Pharmaceutical Company, Assiut, Egypt
- May2006-current Public and Community Pharmacist

Experience and Skills:

Research skills:

Super-resolution structured illumination fluorescence microscopy (SIM), fluorescence microscopy, SEM, TEM Dynamic light scattering (DLS), HPLC, spectroflourimetry, spectrophotometry, TLC-chromatograh, UV-fluorescence plate reader and other lab equipment. Synthesis, evaluation and fabrication of nanosensors/biosensors for biological/intracellular measurements on a research scale and industrial scale.

Nanoparticle Fabrication, characterisation and functionalisation. Design of analytical strategies for bioanalysis and screening of pharmaceutical compounds, toxic and biological materials in pure form, dosage forms and biological fluids with GMP method validation.

Teaching skills:

Teaching and lab demonstration of qualitative, quantitative, instrumental analysis and bioanalytical statistics for undergraduate pharmacy students for more than 6 years.

Marketing and selling skills:

By working and collaboration with industrial partners (Julphar, Egypt and TBG Solutions, UK) I gained good marketing and selling skills for pharmaceutical products and medical diagnostics. Planning, developing and using nanotechnology to fabricate market-high demand medical products (biosensors) for in-home disease diagnosis.

Interests:

Through my career in research and academia, I have acquired many skills in teaching, research planning and management, leadership and team working. This enabled me to collaborate in many projects, both locally and internationally which allowed me to fill in the gap between the research and industry. My research interests are mainly focus on development, fabrication and commercialisation of innovative products (nanosensors) for biological measurements and biomedical diagnosis. In addition, my collaboration with the industry allowed me to gain good skills on how to plan, fabricate and commercialise certain products for market use. Overall, I believe that application of my skills in high-impact projects will improve my personality and help me to continue on my career of exploring solutions for current scientific/public problems. Meanwhile, by conducting this type of research and transferring this knowledge to new students will contribute in building a new generation that able to face current limitations and improve their skills which could finally participate in enhancing our life.

Memberships and activities:

Member of General Egyptian Pharmacists Syndicate since 2006 until today.

Associate member in the Royal Pharmaceutical Society in UK since 2014 till now.

Associate Member in the Royal Society of Chemistry, RSC, London, UK.

Member of AMHT research group, University of Nottingham, UK.

Conferences:

Applied Nanotechnology and Nanoscience International Conference, November 2015, Paris, France.

Sensors 2015; Bioanalytical Sensing Technologies, June 2015, RSC Conference, London, UK

Scientific Symposium, May 2015, Imperial College London, UK.

Pharmacy Postgraduate Students Poster Day, School of Pharmacy, June 2014, University of Nottingham, UK.

IDB First Scientific Symposium, May 2014, University of Cambridge, UK.

IDB Annual gathering, May 2013, Birmingham University, UK,

Symposium of Assiut University 8th International Pharmaceutical Science Conference, 2012”

Symposium of Assiut University 7th International Pharmaceutical Science Conference, 2010”

Publications:

1- Mohamed M Elsutohy, Veeren M Chauhan, Robert Markus, Mohammed Aref Kyyaly, Saul JB Tendler and Jonathan W Aylott, Real-time measurement of the intracellular pH of yeast cells during glucose metabolism using ratiometric fluorescent nanosensors, In-peer review, Nanoscale.

- 2- Mohamed M Elsutohy, Amjad A Selo, Veeren M Chauhan, Saul JB Tendler and Jonathan W Aylott, From engineering the architecture of silica nanoparticles to ratiometric fluorescent pH-sensitive nanosensors and improved distance-dependent fluorescence quenching, Under preparation.
- 3- Mohamed M Elsutohy, Saul JB Tendler and Jonathan W Aylott Aptamer-based fluorescence-quenching nanosensors for the detection of DNA and interferon gamma, Under preparation.
- 4- Veeren M Chauhan, Mohamed M Elsutohy and Jonathan W Aylott, Lateral flow gold based nanosensors for viral diagnosis, Under preparation.
- 5- Mohamed M. El-Sutohy, Salwa R. El-Shaboury, Samiha A. Hussein, Niveen A. Mohamed, Validated non-extractive spectrophotometric methods for determination of some angiotensin II receptor antagonists, *Asian J. Pharmaceutical Analysis*, 2013, 3, 3-8.
- 6- Salwa R. El-Shaboury, Samiha A. Hussein, Niveen A. Mohamed, Mohamed M. El-Sutohy, Stability indicating densitometric determination of some angiotensin II receptor antagonists in presence of their degradation products, *Acta Chromatographica*, 2013, 25, 79-95.
- 7- Salwa R. El-Shaboury, Samiha A. Hussein, Niveen A. Mohamed, Mohamed M. El-Sutohy, Spectrofluorimetric method for determination of some angiotensin II receptor antagonists, *Journal of Pharmaceutical analysis*, 2012, 2, 12-18.

Prizes and awards:

Islamic Development Bank, IDB-High Tech Merit Scholarship to study PhD, one of the most prestigious scholarships in the world.

Honouring from Alexandria Pharmacy Syndicate, Egypt

Excellence Award from General Egyptian Pharmacy Syndicate in the Ideal Pharmacist Day.

References:

Jonathan W. Aylott, Associate Professor of Analytical Sciences, School of Pharmacy, University of Nottingham, jon.aylott@nottingham.ac.uk.

Saul Tendler, Deputy Vice Chancellor, University of York, saul.tendler@york.ac.uk.

Development of fluorescent nanosensors for real-time biological assays

Mohamed Mounir Fathallah Elsutohy, Msc

Thesis submitted to the University of Nottingham for the degree of
Doctor of Philosophy

September 2016

I. Abstract

The current advances of nanotechnology in medicine and biology open new horizons towards the development of novel tools (nanosensors) for the detection of several biological compounds, disease biomarkers and cellular molecules. Fluorescent nanosensors are utilised as efficient, rapid and sensitive probes in many analytical and biological applications. The small size of nanosensors enables their insertion into live cells, with minimal cellular disturbance, to detect a specific target within the intracellular environment in real-time.

The work described within this thesis outlines the development of fluorescent nanosensors for the detection of cellular and biological markers. Chapter one illustrates a brief introduction for the different types of nanosensors and the methods that are utilised for nanosensor characterisation. Chapter Two describes the development, fabrication and characterisation of size-tuneable ratiometric fluorescent pH nanosensors. The nanosensors were able to detect the pH, one of the most important biological markers, over an extended dynamic range from pH 3.5 to 7.5, encompassing the pH of many biological systems. Chapter Three demonstrates the utilisation of the developed pH nanosensors for the real-time measurement of the intracellular pH of yeast cells, as a model eukaryotic cell, during glucose metabolism. Chapter Four details the study of the process of fluorescence quenching using size controlled core-shell silica nanoparticles. The study showed interesting results for enhanced distance-dependent fluorescence quenching assay using silica nanoparticles. In Chapter Five, aptamer-based fluorescent nanosensors have been developed for the quantitative assay of DNA hybridisation and interferon gamma, a model cytokine.

Thesis title: Development of fluorescent nanosensors for real-time biological assays

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