بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / مني مغربي أحمد

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

NANO-PARTICLES CONTROL AND SEPARATION USING DIELECTROPHORESIS-BASED MICROFLUIDIC PLATFORMS

By

Ibrahim Khalaf Selim Saleh

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of

INTERDISCIPLINARY-MASTER OF SCIENCE
in
ADVANCED MATERIALS AND NANO-MATERIALS

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Title of Thesis:

NANO-PARTICLES CONTROL AND SEPARATION USING DIELECTROPHORESIS-BASED MICROFLUIDIC PLATFORMS

Key Words:
Lab-on-a-chip; Dielectrophoresis; BioMEMS; Microfluidic; Microelectrodes.

Summary:

The goal of this thesis is to develop a microfluidic platform that can be used to manipulate and characterize submicron particles like latex spheres and viruses using the dielectrophoresis concept. Using appropriate microfluidic channels, flow velocity, microelectrode arrays and voltage settings, particles can be trapped or moved between regions of high or low electric fields. The magnitude and direction of the dielectrophoretic force on the particle depends on the effective dielectric - intrinsic - properties of fluid and particles.
In the first proposed model, I demonstrated how nanoparticles can be separated in a controlled dielectrophoretic manner, as well as how different types of submicron latex beads and viruses can be spatially separated using upper and lower electrode arrays.
I also developed a novel vertical array capacitance sensor to track cells and derive a variety of characteristics using the second proposed model. The findings support the proposed system's ability to levitate and track various types of biological cells (foodborne bacteria) using a capacitive sensor array.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: **Ibrahim Khalaf Selim Saleh** Date: …..…/…..…./……

Signature:

Dedication

Dedicated to the memory of Prof Dr **Mohamed Sameh Said**, the founder of M.Sc. Multidisciplinary Program in Advanced Materials and Nanomaterials, who always believed in my ability to be successful in the academic arena. You are gone but your belief in me has made this journey possible.

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Finally, I cannot forget to thank my family for their continual love and support during the compilation of this dissertation.

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