

# Mahmoud Salah Hosny Abdelkarim

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Mechanical Engineering Department, Assiut University, 71516, Asyut, Egypt



## Summary

- Over 4 years' experience in microfluidics applications, especially in medical applications, and assist in the teaching of Fluid Mechanics courses.
- Skilled in cleanroom microfabrication (thin film deposition, photolithography, and soft lithography).
- Competent in simulation using COMSOL Multiphysics.
- First-author of two publications and co-author of two publications (peer-reviewed journals and conferences).

## Education

**August 2020: M.Sc. Mechanical Engineering, Assiut University, Egypt**

**(Defense)**

**Mandatory**

**Egyptian Military  
Service for 13.5  
months**

- Cumulative grade point average on M.Sc. Coursework **(2016): 91.8% (distinction)**
- Thesis title: Optimization of Nanoparticles Synthesis Using Microfluidics.

**July 2014: B.Sc. Mechanical Engineering, Assiut University, Egypt.**

- Cumulative average grade: **Distinction with Honors (88.71 %)**
  - Ranked 1<sup>st</sup> out of (118) students in the Mechanical Engineering Department.
- Graduation project grade: Distinction (funded by [ASRT](#) ~ \$ 10000).
  - Title: Microchannel Heat Sink for Electronics Cooling.

## Publications

### Journal Papers

1. **Mahmoud Abdelkarim**, Noura H. Abd Ellah, Mahmoud Elsabahy, Sara A. Abouelmagd, And Mohamed Abdelgawad, [Microchannel geometry vs flow parameters for controlling nanoprecipitation of polymeric nanoparticles](#). Colloids and Surfaces A: Physicochemical and Engineering Aspects, vol. 611, Feb. 2021.
2. Fathi, H. A., A. Abdelkader, **M. S. Abdelkarim**, A. A. Abdelaziz, M. A. El Mokhtar, A. Allam, G. Fetih, M. El Badry And M. Elsabahy, [Electrospun Vancomycin-Loaded Nanofibers for Management of Methicillin-Resistant Staphylococcus Aureus-Induced Skin Infections](#), International Journal Of Pharmaceutics, 2020. 586: P. 119620.

### Conference Papers

3. **Mahmoud Abdelkarim**, Noura H. Abd Ellah, Mahmoud Elsabahy, Sara A. Abouelmagd, And Mohamed Abdelgawad, [Optimization Of Preparation Of Polymeric Nanoparticles Using Microfluidics](#), 22nd International Conference On Miniaturized Systems For Chemistry And Life Sciences ( $\mu$ TAS 2018), 11-15 Nov. 2018.
4. M. B. Effat, **M. S. Abdelkarim**, O. Hassan, And M. Abdelgawad, [Numerical Investigations Of The Effect Of Flow Arrangement And Number Of Layers On The Performance Of Multi-Layer Microchannel Heat Sinks](#), The (ASME) International Mechanical Engineering Conference and Exposition, Houston Texas, 13-19 Nov. 2015.

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## Conference Presentations/Posters

5. **Mahmoud Abdelkarim**, Noura H. Abd Ellah, Mahmoud Elsabahy, Sara A. Abouelmagd, And Mohamed Abdelgawad, Mixing Time Controls The Formation Of Polymeric Nanoparticles In Microfluidic Channels, 12th International Pharmaceutical Science Conference, Faculty Of Pharmacy, Assiut, Egypt, 4-5 Nov 2020.
6. **Mahmoud Abdelkarim**, Noura H. Abd Ellah, Mahmoud Elsabahy, Sara A. Abouelmagd, And Mohamed Abdelgawad, Tuning Nanoparticles Size Via Microchannel Geometry, Vancouver Nanomedicine Day, Virtual Conference, 17 Sept 2020. [https://www.nanomedicines.ca/2020/09/10/83\\_Mahmoud/](https://www.nanomedicines.ca/2020/09/10/83_Mahmoud/)

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## Research Experience

### **2019 Visiting graduate student, University of Toronto, Canada.**

Jan 1<sup>st</sup>- Mar 31<sup>st</sup> Advanced Micro and Nanosystems Laboratory ([AMNL](#)), Mechanical and Industrial Engineering Dept

- Electroporation for intercellular delivery using microfluidics devices (Numerical study).
- Flow analysis of automated aspiration of sperm cell using CellTram Oil
- Designed a hydraulic circuit for microfluidic device mimicking tumour vascular structures.
- Mask aligner (training).

### **2015 –Present Research Assistant, Assiut University, Egypt.**

Assiut Microfluidics Lab ([AML](#)), Mechanical Engineering Dept., Assiut University

- Designed and fabricated microfluidic devices for the optimization of nanoparticles synthesis and optimized fabrication processes in the cleanroom.
- Simulated fluid flow and mass transfer inside microchannels to optimize channel design for better mixing.
- Established an experimental setup for synthesizing nanofibers.
  - Ran nanofibers synthesis experiments.
  - Measured all properties of the solutions used (conductivity, viscosity, surface tension, density)
- Designed and conducted simulations for microchannel heat sinks for cooling electronics.
- Trained new research assistants on microfabrication

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## Teaching Experience

### **Nov. 2020 – Present Assistant Lecturer, Mechanical Engineering, Assiut University, Egypt.**

- (Full-time)**
- Courses:
    - Fall semester: Fluid Mechanics (I), Fluid Mechanics (II), Thermodynamics (I), Mechanical Power Lab, and Engineering Drawing.
  - Administrative work related to The National Authority for Quality Assurance and Accreditation of Education “NAQAAE” at the Mechanical Engineering Department.

### **Oct. 2014 – Nov. 2020 Demonstrator (Teaching Assistant), Mechanical Engineering, Assiut Univ., Egypt.**

- (Full-time)**
- Courses:
    - Fall semester: Fluid Mechanics (I), Thermodynamics (I), Measuring Instruments, and Engineering Drawing.
    - Winter semester: Fluid Mechanics (II), Thermodynamics (I), Hydraulic Machines, Measuring Instruments Lab, and Engineering Drawing.

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- Preparing the tutorial problems and quizzes for the student.
  - Demonstrating the problems in tutorials.
  - Explaining concepts in one-on-one meetings with students.
  - Marking a variety of assessment formats: assignments, demonstrating the projects, technical examinations.
  - Administrating work related to the faculty of engineering (Equipment Inspection Committees).

## Extra Work Experience

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### 2016-2020 Freelance Engineering Consultant, Asyut, Asyut, Egypt.

- Diagnosed and troubleshot engineering and technical faults for lab equipment and instruments.
- Helped customer to choose the proper instruments for their applications.
- Contacted with different companies and responsible for importing equipment and instruments.

## Grants and Awards

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- 2019 • Egyptian Mission Short Term Scholarship to the University of Toronto
- 2018 • CBMS travel grant, MicroTAS 2018.
- 2018 • Egyptian Ministry of Higher Education fund for researcher support
- 2018 • Academy of Scientific Research and Technology (ASRT) travel grant
- 2017 • Faculty of Engineering research grant.
- 2014 • Conference attending fund from Assiut university (the 7<sup>th</sup> Cairo International Biomedical Engineering Conference (CIBEC2014)).
- 2010-2011-2012-2013-2014 • Assiut University's award for academic excellence.

## Skills

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- **Cleanroom microfabrication** (includes soft lithography, photolithography): Mask Aligner, Pattern Generator ( $\mu$ PG101), Thermal Evaporator, Sputtering.
- **Software skills:** COMSOL, AutoCAD, SolidWorks, basics in Prism.
- Mammalian cell culture (basics).
- **Language:** Arabic, English (IELTS- Academic): 6.5 (Listening: 7, Reading: 6.5, Speaking: 6.5, Writing: 6)

## References

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