

Prof. Dr. Eyad Hamad

Professor, Biomedical Engineering Dept.

School of Applied Medical Sciences German Jordanian University. Naour-Amman, Jordan

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Curriculum Vitae

Work Experience

12/2023 – Present

Professor

Biomedical Engineering Department
School of Applied Medical Sciences
German Jordanian University (Amman, Jordan)

09/2022 – 09/2023

Associate Professor

Biomedical Engineering Department
School of Engineering and Computing
American International University (Kuwait, Kuwait)

06/2017 – 12/2023

Associate Professor

Biomedical Engineering Department
School of Applied Medical Sciences
German Jordanian University (Amman, Jordan)

07/2015 – 9/2016

Visiting Researcher

Bioelectronics (PGI-8/ICS-8)
Research Institute
Jülich (FZJ), Germany

- Establishing a new process of microfluidic device fabrication using 3D prototyping
 - Rapid prototyping and iterative testing of pre-simulated structures using a desktop SLA 3D printer
- Inkjet printing of UV-curable adhesive and dielectric ink for microfluidic devices

02/2013 – 5/2017

Assistant Professor

Biomedical Engineering Department
School of Applied Medical Sciences
German Jordanian University (Amman, Jordan)

07/2014 – 9/2014

Visiting Researcher

Institute of Electromechanical Design
Microtechnology und Electromechanical Systems
Technische Universität Darmstadt (Darmstadt, Germany)

- Optimizing Efficiency of MEMS Actuators
 - Production of Micro-electromechanical systems (MEMS) using Semiconductor lithography and thin-film structures and Microfluidics
- ANSYS Electrothermal Mechanical Simulations

12/2010 – 03/2011

Research Associate in “Sensors and Connected Health Research Group”

- University of Ulster (Belfast, UK)
 - Development and evaluation of novel platform technology for the production of low-density microarray biochips for “Point-of-care applications”
 - Production of point-of-care cardiac marker monitoring systems particularly for the early diagnosis and treatment of heart disease
 - Impedimetric microsensors, microfluidics, and Lab-on-a-chip systems
- Semiconductor lithography and thin-film structures

11/2007 – 11/2010	<p>Research Associate in “Sensors and Connected Health Research Group” including Ph.D. studies University of Ulster (Belfast, UK)</p> <ul style="list-style-type: none"> • Development of single-use devices as lab-on-a-chip • Production of Micro-electromechanical systems (MEMS) • Immobilizations of biochemical and medical molecules • Undertaking measurements and analyzing the results <p>Supervision of Master and Final Year Project Students</p> <ul style="list-style-type: none"> •
09/2006 – 06/2007	<p>Research Assistant Fraunhofer Institute for Laser Technology -ILT (Aachen, Germany)</p> <ul style="list-style-type: none"> • Set-up temperature system for measuring temperature in tissue during laser coagulation • Produce laser welds of consistent strength and durability. • 2-dimensions measurement of the temperature during laser coagulation with a thermal camera • Coagulation of albumin solder on porcine tissue and bonding of collagen membranes on porcine tissue <p>Measurement of bonding strength and Correlation of the temperature signal with strength</p>
Education	
11/2007 – 04/2011	<p>Ph.D. in Biomedical Engineering The University of Ulster, (Belfast, UK) Area of Interest: Sensors consisting of MEMS techniques, Semiconductor fabrications, electrochemical impedance spectroscopy, and Microfluidics Ph.D. Thesis: „<i>Impedimetric sensor for label-free point-of-care immunoassay cardiac marker systems</i>”</p>
03/2005 – 06/2007	<p>M.Sc. in Biomedical Engineering Aachen University of Applied Sciences (Aachen, Germany) Area of Interest: Biomedical Engineering, Laser technology, and Measurement technologies Grade: very good Master Thesis: „<i>Temperature measurement in biological tissue during laser coagulation</i>”</p>
Teaching Experience	<ul style="list-style-type: none"> • Graduation-level course on Research Methodologies • Undergraduate-level course on Medical Signal Processing • Undergraduate-level course on Signals and Systems • Undergraduate-level course on Biosignals and Biosystems • Undergraduate-level course on Biomaterials • Undergraduate-level course on Medical Electronics I and II • Undergraduate-level course on Biomedical Sensors and Transducers • Undergraduate-level course on BioMEMS • Undergraduate-level course on Numerical Methods for Engineers • Undergraduate-level course on Medical Instrumentation • Undergraduate-level course on Artificial Organs
Administrative Experience	
10/2023-present	<p>Vice Dean, Deanship of Graduate Studies German Jordanian University (Amman, Jordan)</p>
9/2021 – 09/2022	<p>Vice Dean, School of Applied Medical Sciences German Jordanian University (Amman, Jordan)</p>
9/2021 – 09/2022	<p>Exchange Coordinator, Biomedical Engineering Department, School of Applied Medical Sciences German Jordanian University (Amman, Jordan)</p>

2/2017 – 8/2018	Vice Dean, School of Applied Medical Sciences German Jordanian University (Amman, Jordan)
9/2016 – 8/2018	Exchange Coordinator , Biomedical Engineering Department, School of Applied Medical Sciences German Jordanian University (Amman, Jordan)
10/2015 – 8/2016	Vice Dean, School of Applied Medical Sciences German Jordanian University (Amman, Jordan)
06/2013 – 09/2015	Head of Biomedical Engineering Department (Chairman) School of Applied Medical Sciences German Jordanian University (Amman, Jordan) - Devised new and enhanced plans of study for the Biomedical Engineering Department Establishment of teaching labs for biomedical engineering undergraduates
Funded Research Projects	<p><i>Fabrication and characterization of impedance sensors on silicon/glass with varied gap and pitch interdigitated electrode structure designs.</i> J.A. McLaughlin and Eyad Hamad, €26,215.00 Science Foundation Ireland (National Access Programme), 2009.</p> <p><i>Optimizing Efficiency of MEMS Actuators</i>, (SCHL 532/10-1) H. Schlaak and Eyad Hamad. €8,500 Deutsche Forschungsgemeinschaft, 2014.</p> <p><i>Developing and Fabrication of Capacitive Micro Electromechanical System (MEMS) Interactive DCIAC Power Inverter for Renewable Energy Applications</i>, 41250 JOD (\$58,098.60), Scientific Research Support Fund, 2015</p> <p><i>Vocational training Center for undergraduate university students and teachers in Jordan</i>, €689,938 Erasmus+, 2015.</p> <p><i>3D-Prototypisierung von Mikrofluidik fuer die Zuleitung und Filtration von Vollblut auf einem Chip fuer Biosensoren</i>, (SCHO 1243/3-1) M.J. Schoening and E. Hamad, €9,450. Deutsche Forschungsgemeinschaft, 2015.</p> <p><i>Diversity Oriented Fluorescent Peptides as a Biomimicking Glucose Sensors</i>, (BAS/1/7/2018) 135,400.00 JOD (\$190,705), Scientific Research Support Fund, 2018.</p> <p><i>3D-prototyping of a microfluidic device for whole blood filtration in a Lab-on-Chip</i> (SAMS/1/2019) 66,950.00 JOD (\$ 94,295)</p> <p><i>Severe Illness Detection for Home-Quarantined COVID-19 Patients Using Wearable Sensors and IoT Technology</i> (Cor-ENG 1/02/2020) 15025 JOD (\$21,191) Scientific Research Support Fund, 2020.</p> <p><i>Development and Fabrication of Low-Cost, High-Tech Stretchable and Wearable Cardiac Sensor For Low-Resources Settings.</i> 35800 JOD (\$50,493) Applied Research and Innovation Program (ARIF 2019) ALQUDS Academy for Scientific Research 2021.</p> <p><i>Fabrication and validation of innovative disposable biosensing platforms targeting organophosphates for effective on-site monitoring of food products and wastewater in Arab countries</i> (\$400,000) Arab Research & Innovation Co-Funded Alliances (ARICA) 2023</p>
Undergraduate Research Projects	<ul style="list-style-type: none"> • Flexible sensors know-how reuse platform with the implementation of failure detection system to aid in medical devices handling • A Deep Learning Framework for Predicting the behavior of Siemens MR Systems • Heat and Cool Treatment of Muscle Injuries Using the Thermo-electric Module • Microfluidics for Blood separations based on Zweifach-Fung Bifurcation-law • The Study of Impedance Detection Using Ink-Jet Printed Interdigitated Electrodes • BCI command based for controlling a wheelchair using oscillatory brain activity • Development of a Computer Programmable Pressure Supply • Optimizing the NXT Mindstorms 2.0 for helping the Elderly and Visually Impaired People • IR Glucose Biosensor, Proof of concept • Enhancement of blood filtration using microfluidic channels: Optimization • Living Cells in Electrowetting-based Assays • Micro-Level Blood Separation: Enhancement of the Inlet Channel- Modelling and Simulation • Digitalization of lateral flow assay

Professional Memberships Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
 Member, Institution of Engineering and Technology (IET)
 Member, Verein Deutscher Ingenieure (VDI)
 Member, Jordan Engineers Association (JEA)
 Member (Alumuns), Global Young Academy (GYA)

Professional Services

- Graduate Studies Council 2023/2024
- BioNanotechnology & BioMEMS (BNM) EMBS IEEE Committee 2020/2021/2022/2023/2024
- Rules and Regulation Committee 2021/2022
- University Council 2014/2015, 2021/2022
- University Scientific Research Council 2017/2018
- School council for academic years 2013/2014, 2014/2015, 2015/2016, 2016/2017, 2017/2018, 2018/2019, 2021/2022
- School laboratory tenders Committee 2013/2014, 2014/2015, 2015/2016, and 2016/2017
- School study plan committee 2013/2014, 2014/2015
- School accreditation committee 2013/2014, 2014/2015
- School faculty recruitment committee 2013/2014, 2014/2015
- School scientific research committee 2013/2014, 2014/2015
- German Year Committee 2016/2017, 2021/2022

Honors and Awards

EU Marie Curie EST Fellowship, Belfast, UK. 2007.

Runner up, "present around the world", IET, Belfast, UK, 2009

Deutsche Forschungsgemeinschaft (DFG) Scholarship, Darmstadt, Germany, 2014

Deutsche Forschungsgemeinschaft (DFG) Scholarship, Jülich, Germany, 2015

Gold Medal in International Invention Fair of the Middle East (IIFM) Kuwait Science Club Kuwait, 2020

Reviewer

- Microsystem Technologies Journal
- Jordan Journal of Mechanical and Industrial Engineering
- Jordan Journal of Biological Sciences
- IEEE EMBC 2018

Associate Editor

- IEEE EMBC 2018
- IEEE EMBC 2019
- IEEE EMBC 2020
- IEEE EMBC 2021
- IEEE EMBC 2022
- IEEE EMBC 2023
- IEEE EMBC 2024

Languages

Arabic: Mother tongue
 English: Fluent
 German: Very good

Publications: Patents

J. Kujawa, S. Al-Gharabli, W. Kujawski, **E. Hamad**, Activation methods of inert polymeric material, particularly fluoropolymeric materials, [WIPO ST 10/C PL.428315] [PCT/PL2018/000129].

Publications: Journal Papers

Jeffrey T Borenstein, Jie Chen, Gerard Cummins, Abhishek Dutta, **Eyad Hamad**, Michael Pycraft Hughes, Xingyu Jiang, Hyowon (Hugh) Lee, Kin Fong Lei, Xiaowu (Shirley) Tang and Yuanjin Zheng, (2023), BioNanotechnology and BioMEMS (BNM): State-of-the-Art Applications, Opportunities, and Challenges, *Lab on a Chip*, Lab Chip, 2023,23, 4928-4949
<https://doi.org/10.1039/D3LC00296A>

Hamad, E. M., Alabed, S., Alsaraira, A., & Saraereh, O. A. (2024). Implementing and developing multi-stage cryptography technique for low-cost long-range communication system. *Bulletin of Electrical Engineering and Informatics*, 13(1), 264-276. DOI: <https://doi.org/10.11591/eei.v13i1.6989>

Hamad, E. M., Albagdady, A., Al-Gharabli, S., Alkhadire, H., Alnaser, Y., Shadid, H., ... & Al-Halhouli, A. A. (2023). Optimizing Rapid Prototype Development Through Femtosecond Laser Ablation and Finite Element Method Simulation for Enhanced Separation in Microfluidics. *Journal of Nanofluids*, 12(7), 1868-1879. DOI: <https://doi.org/10.1166/jon.2023.2102>

Alsaraira, A., Alabed, S., **Hamad, E.**, & Saraereh, O. (2023). An Optimal Framework for Alzheimer's Disease Diagnosis. *Intelligent Automation & Soft Computing*, 37(1). <https://doi.org/10.32604/iasc.2023.036950>

Alabed, S., Al-Rabayah, M., Mostafa, N., AlArnaout, Z., **Hamad, E. M.**, Maaz, I., & Kotb, Y. (2023). Differential beamforming using Rotman lens for wireless sensor networks. *ICT Express*. <https://doi.org/10.1016/j.ict.2023.05.005>

Al-Gharabli, S., El-Rub, Z. A., **Hamad, E. M.**, Kujawski, W., Flanc, Z., Pianka, K., ... & Kujawa, J. (2022). Toward anti-fouling properties and enhanced performance in separation process-carbon nanotubes-PVDF hybrids. *Applied Surface Science*, 602, 154341. <https://doi.org/10.1016/j.apsusc.2022.154341>

Hamad, Eyad M; Al-Gharabli Samer; Kujawa Joanna "Tunable hydrophobicity and roughness on PVDF surface by grafting to mode—approach to enhance membrane performance in membrane distillation process", *Separation and Purification Technology*, 291 (2022)120953 doi.org/10.1016/j.seppur.2022.120935

Hamad E.M., Khaffaf, A., Yasin, O., Abu El-Rub, Z., Al-Gharabli, S., Al-Kouz, W., & Chamkha, A. J. (2021). Review of nanofluids and their biomedical applications. *Journal of Nanofluids*, 10(4), 463-477. (<https://doi.org/10.1166/jon.2021.1806>)

Al-Gharabli, S., Abu El-Rub, Z., **Hamad, E.**, Kujawski, W., Flanc, Z., Pianka, K., & Kujawa, J. (2021). Surfaces with Adjustable Features—Effective and Durable Materials for Water Desalination. *International Journal of Molecular Sciences*, 22(21), 11743. <https://doi.org/10.3390/ijms222111743>

Barghash, A., Al-Gharabli, S. I., Jweihan, M., Tanbouz, M., AlBarahmieh, E., **Hamad, E.**, ... & Tahtamouni, L. H. (2020). Angiotensin Converting Enzyme (ACE) Gene Polymorphism in Jordanian Type-1 and Type-2 Diabetic Patients. *Jordan Journal of Biological Sciences*, 13(2).

Al-Gharabli, S., Kujawski, W., El-Rub, Z.A., **Hamad, E.M.** and Kujawa, J., (2018). Enhancing membrane performance in removal of hazardous VOCs from water by modified fluorinated PVDF porous material. *Journal of Membrane Science*, 556, pp.214-226. DOI: doi.org/10.1016/j.memsci.2018.04.012

Al-Gharabli, S., **Hamad, E.**, Saket, M., Abu El-Rub, Z., Arafat, H., Kujawski, W. and Kujawa, J., (2018). Advanced material-ordered nanotubular ceramic membranes covalently capped with single-wall carbon nanotubes. *Materials*, 11(5), p.739. DOI: doi.org/10.3390/ma11050739

Al-Gharabli, S., Kujawa, J., Mavukkandy, M.O., Agbaje, T.A., **Hamad, E.M.** and Arafat, H.A., (2018). Covalent surface entanglement of polyvinylidene fluoride membranes with carbon nanotubes. *European Polymer Journal*, 100, pp.153-164. DOI:doi.org/10.1016/j.eurpolymj.2018.01.027

Hamad, E.M., Rawashdeh, N.A., Khanfar, M.F., Al-Qasem, E.N. and Al-Gharabli, S.I., 2017. Neural Network Based Prediction of 3D Protein Structure as a Function of Enzyme Family Type and Amino Acid Sequences. *Jordan Journal of Biological Sciences*, 10(2).

A. a. Al-Halhouli, H. Oitouqa, N. Malkosh, A. Shubbak, S. Al-Gharabli, and **E. Hamad**, "LEGO Mindstorms NXT for elderly and visually impaired people in need: A platform," *Technology and Health Care*, vol. 24, pp. 579-585, 2016. (DOI: 10.3233/THC-161140)

Hamad EM, Bilatto SE, Adly NY, Correa DS, Wolfrum B, Schöning MJ, Offenhäusser A, Yakushenko, "Inkjet printing of UV-curable adhesive and dielectric inks for microfluidic devices". *A. Lab on a Chip*. 7;16(1):70-74. (2016)
DOI: [10.1039/c5lc01195g](https://doi.org/10.1039/c5lc01195g)

HA Kloub, **EM Hamad**, (2015) "Electromechanical modeling and designing of capacitive MEMS DC/AC interactive power inverter for renewable energy applications" *Microsystem Technologies*, DOI: doi.org/10.1007/s00542-015-2767-1

Publications: Conference Papers

Hamad, E. M., Sawalmeh, B., Al Mhawsh, A., Mansour, M., Awad, M., Al-Halhouli, A. T., & Al-Gharabli, S. I. (2019, July). Investigation of Bifurcation Effect on Various Microfluidic Designs for Blood Separation. In *2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 1097-1100). IEEE.
<https://doi.org/10.1109/EMBC.2019.8856380>

Hamad, E. M., et. Al., 2019 "Sensitivity Enhancement of Point-of-Care for Cardiac Markers Detection using Micro-Impedimetric Immunosensor Arrays " in 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS), 23-27 July. 2019.

Hamad, E.M., Hawamdeh, G., Jarrad, N.A., Yasin, O., Al-Gharabli, S.I. and Shadfan, R., 2018, July. Detection of Human Chorionic Gonadotropin (hCG) Hormone using Digital Lateral Flow Immunoassay. In *2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 3845-3848). IEEE.

S. Al-Gharabli, M. Saket, **E. Hamad**, H. Arafat, W. Kujawski, J. Kujawa, "Ordered nano-tubular ceramic membrane covalently capped with carbon nanotubes for selective separation of biological active compounds," in *11th International Congress on Membranes and Membrane Processes*, 2017.

J. Kujawa, S. Al-Gharabli, W. Kujawski, Z. Abu El-Rub, **E. M. Hamad**, "Fluorinated membranes, activated by Piranha reagent and grafted with fluoralkylsilanes and alkylsilanes for the removal of hazardous VOCs", *Euromembrane 2018, Valencia (Spain)* 9-13.07.2018 – (oral presentation)

S. Al-Gharabli, M. Mavukkandy, T. Agbaje, **E. Hamad**, H. Arafat, "Covalent surface entanglement of single walled carbon nanotube on polyvinylidene fluoride membranes," in *11th International Congress on Membranes and Membrane Processes*, 2017.

S. Al-Gharabli, J. Kujawa, W. Kujawski, **E. M. Hamad**, "How surface functionalization can influence membrane performance?", *Euromembrane 2018, Valencia (Spain)* 9-13.07.2018 – (poster presentation)

S. Al-Gharabli, M. Saket, **E. Hamad**, H. Arafat, W. Kujawski, J. Kujawa "Ordered nano-tubular ceramic membrane covalently capped with carbon nanotubes for selective separation of biological active compounds" *11th International Congress on Membranes and Membrane Processes, San Francisco (USA)* 29.07 – 4.08.2017 (poster presentation)

S. Al-Gharabli, **E. Hamad** "Development of novel insulating paints from local natural resources" *XI Copernican International Young Scientists Conference, Torun (Poland)* 28 – 30.06.2017 (poster presentation)

E. M. Hamad, S. Al-Gharabli "Microfluidic blood separation: enhancement of channel design, modeling and simulation" *XI Copernican International Young Scientists Conference, Torun (Poland)* 28 – 30.06.2017 (poster presentation)

Hamad, Eyad M., Samer I. Al-Gharabli, Munib M. Saket, and Omar Jubran. "A Brain Machine Interface for command based control of a wheelchair using conditioning of oscillatory brain activity." In *2017 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, pp. 1002-1005. IEEE, 2017. DOI:[10.1109/EMBC.2017.8036995](https://doi.org/10.1109/EMBC.2017.8036995)

Alazrai, R.; Mowafi, Y.; **Hamad, E.**, (2015) "A fall prediction methodology for elderly based on a depth camera" in *37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS)*, vol., no., pp.4990-4993, 25-29 Aug. 2015 DOI: [10.1109/EMBC.2015.7319512](https://doi.org/10.1109/EMBC.2015.7319512)

E.M. Hamad, E.T. McAdams and J.A. McLaughlin. 26th-29th Sep. 2010. "*Impedimetric point-of-care cardiac marker system*" *Computing in Cardiology Conference 2010, Belfast, UK*. 37:201-204, ISSN 0276-6574

A. Mathur, **E. Hamad**, S. Mukhopadhyay, S. S. Roy, P. Dunlop, and J.A. McLaughlin. Jun., 2010 "*Carbon nanotubes based microfluidic system for microparticle separation and sensing applications*, E-MRS 2010 Spring Meeting. Strasbourg, France

E.M. Hamad, P.SM Dunlop, P.D Maguire and J.A. McLaughlin. May. 2010. "Enhancing the sensitivity of point-of-care cardiac marker detection using interdigitated impedimetric immunosensor arrays", Biosensors 2010, 20th Anniversary World Congress on Biosensors, Glasgow, United Kingdom

Mathur, A; Mukhopadhyay S; Hamad, E; Roy, SS and McLaughlin, JAD (February 2010) "Integration of carbon nanotubes arrays on polymeric microfluidic channels for blood analytes separations and detection in lab-on-a chip system". International Conference on Nano Science and Technology (ICONSAT), Mumbai, India.

P.S.M. Dunlop, E. M. Hamad, J.A. McLaughlin, 27th January 2010 "Fabrication and characterization of impedance sensors on silicon/glass with varied gap and pitch interdigitated electrode structure designs". NAP workshop, Tyndall National Institute, Cork

E. M. Hamad, P. D. Maguire and J. A. McLaughlin. 19th Jan. 2010 "Impedimetric point-of-care cardiac marker system". The Faculty of Computing & Engineering Research Student Conference, University of Ulster, UK.

A. Mathur, E. M. Hamad, S. Mukhopadhyay, S. S. Roy, and J. A. McLaughlin, "Microparticle filtration using carbon nanotubes and impedance characterisation for gold microelectrodes sensor system," in *MRS Proceedings*, 2009, pp. 1205-L09-12

A. Mathur, E. Hamad, S. Mukhopadhyay, S. S. Roy, and J.A. McLaughlin. Dec. 2009 "Integration of Carbon Nanotube Arrays in Lab-on-a-chip System for Blood Analyses Separation and Detection". MRS-Fall meeting 2009 Boston, USA

E. M. Hamad, PSM Dunlop, P. D Maguire and J. A. McLaughlin. Jun., 2009. "Sensitivity of impedimetric point-of-care cardiac marker immunosensor, beyond sub-microscale gap-size IDEs", International Workshop entitled "Nanotechnology-Enabled Sensors & Diagnostics". Dublin, Ireland

E. M. Hamad, P. Rubel, P. D. Maguire and J. A. McLaughlin. Mar., 2009. "Investigation of gap size on the sensitivity of an Impedimetric sensor for label-free point-of-care immunoassay cardiac marker systems". The Computing and Engineering Research Conference. Belfast, United Kingdom.

E. M. Hamad and J. A. McLaughlin. Jan., 2009. "Investigation of gap size on the sensitivity of an Impedimetric sensor for label-free point-of-care immunoassay cardiac marker systems". International Conference on trends in Bioanalytical Sciences and Biosensors. Dublin, Ireland.