

“Ala'aldeen” Tawfeek Al-Halhouli**Associate Professor**

Mechatronics Engineering Department
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Institute of Microtechnology (IMT)
Technische Universität Braunschweig
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BIOGRAPHY

Ala'aldeen Al-Halhouli joined the mechatronics engineering faculty at the German Jordanian University in March 2013. He obtained a B.Sc. degree in Mechanical Engineering from Mu'tah University, Jordan in 1999, a M.Sc. degree from the University of Jordan in 2001, a Ph.D. degree from the University of Jordan in 2007 and a habilitation degree with Venia Legendi on microfluidics from the “Technische Universität Braunschweig (TU BS)” in Germany in 2013. In 2005, he received a DAAD scholarship to conduct his Ph.D. research in the area of viscous micropumps at the Institute of Microtechnology (IMT) of TU BS. Between 2007 and 2013, he was working as a research associate and lecturer at IMT. He has special interest in micropumps design, simulation and testing, lab-on-a-chip, electromagnetic based actuators, MEMS and computational fluid dynamics (CFD).

Dr. Al-Halhouli published more than 50 papers in international Journals and conference proceedings. He received several Awards such as the Best Poster Award in the MEMS Alliance Georgetown University, Washington DC, USA, 2009, and the Cray Award for the best published paper in Microtechnology/Microsystem technology, Braunschweig, Germany, 2007.

EDUCATION

Habilitation, Technische Universität Braunschweig, Germany.	January 2013
Ph.D., Mechanical Engineering, University of Jordan, Amman. Dissertation: Numerical Simulation of the Flow Field in a Spiral Micropump.	June 2007
M.Sc. in Mechanical Engineering, University of Jordan, Amman. Thesis: Two-Phase Flow Pressure Drop in a T-Junction.	August 2001
B.Sc. in Mechanical Engineering, Mu'tah University, Jordan	March 1999

PROFESSIONAL EXPERIENCE:

Associate Professor Mechatronics Engineering Department, School of Applied Technical Sciences, German Jordanian University, Jordan	March 2013 – Present
Visiting Researcher Institute for Microtechnology, Technische Universität Braunschweig Braunschweig, Germany.	March 2013 – Present

Group leader and Lecturer June 2010 – February 2013

Institute for Microtechnology (IMT), Technical University Braunschweig
Braunschweig, Germany.

Research Associate and Lecturer June 2007 – 2010

Institute for Microtechnology (IMT), Technical University Braunschweig
Braunschweig, Germany.

Research Assistant (DAAD Scholarship) October 2005 – May 2007

Institute for Microtechnology (IMT), Technical University Braunschweig
Braunschweig, Germany.

Senior Engineer June 2002 – May 2005

Ministry of Public Works and Housing
Al-Zarqa, Jordan.

Teacher assistant February 2000 – August 2001

Mechanical Engineering Department, University of Jordan,
Amman, Jordan.

PUBLICATIONS

Articles in refereed Journals

1. Al-Halhouli A.T., Demming S., Alahmad L., Llobera A., and Büttgenbach S. In-Line Photonic Glucose Biosensor using Integrated Microbeads, submitted, *International Journal of Nano Science and Engineering*.
2. Musmar, S., Al-Halhouli A.T., and Büttgenbach S. New water based micro-cooling system: An experimental study, submitted, *International Journal of Thermal Science*.
3. Al-Halhouli A. T., Waldschik, A., Phataralaoha, A., Kilani M. I., and Büttgenbach, S (2012). Fabrication and Testing of an Integrated Electromagnetic Micropump Based on Electroplated Coils and Microfabricated Polymer Magnets, *Journal of micromechanics and microengineering*. 22, 065027.
4. Demming S., Peterat G., Llobera A., Schmolke H., Bruns A., Kohlstedt M., A.T. Al-Halhouli, Klages C.-P., Krull R., Büttgenbach S (2012). Vertical microbubble column – A photonic lab-on-chip for cultivation and online analysis of yeast cell cultures, *Biomicrofluidics*, 6, 034106.
5. Kilani M. I., Al-Halhouli A. T. and Büttgenbach, S (2011). Shear Stress Analysis in a Ferrofluidic Magnetic Micropump. *Nanoscale Microscale Thermophysical Engineering*. 15 (1), 1 – 15.
6. Al-Halhouli A.T. and Büttgenbach S (2010). Liquid Flow in Curved Microchannels. *International Journal of Theoretical and Applied Multiscale Mechanics*. 1 (3), 253-265.
7. Al-Halhouli A.T., Hammad M., Abu-Mulaweh H.I., Alhusein M., and Al-Shannak B (2010). Two-Phase Slug Flow Pressure Drop in a Tee-Junction. *International Journal of Fluid Mechanics Research*. 37 (2).
8. Al-Halhouli A.T., Kilani M. I., and Büttgenbach S (2010). Development of a Novel Electromagnetic Pump for Bio-medical Applications. *Sensors and Actuators A*, 162 (2), 172-176.
9. Al-Halhouli A.T (2009). Recent Advances in on-Disk Viscous Micropumps. *Journal of Microelectronics and Electronic Packaging*. 6, 1-9.

10. Kilani M. I., Al-Halhouli A. T., Galambos C., Haik Y. S. and Büttgenbach, S (2009). Development of a Surface Micromachined On-Chip Flat Disk Micropump. *Sensors and Transducers*, 107(8), 64-76.
11. Büttgenbach S., Balck A., Demming S., Lesche C., Michalzik M., and Al-Halhouli A.T (2009). Development of on Chip Devices for Life Science Applications. *International Journal of Engineering*, 3 (2), 148-158.
12. Al-Halhouli A.T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S (2008). The Spiral Channel Viscous Micropump. *Dirasat*, 35 (2), 120-128.
13. Al-Halhouli A.T., Abu-Mulaweh H. I., Hammad M., Alhusein M., and Al-Shannak B (2008). Experimental Apparatus for Measurements of Two-Phase Slug Flow Pressure Drop in a Tee-Junction. *International Journal of Mechanical Engineering Education*, 36 (3), 184-192.
14. Al-Halhouli A.T., Kampen I., Krah T., Büttgenbach S (2008). Nanoindentation Testing of SU-8 Photoresist Mechanical Properties. *Microelectronic Engineering*. 85(5-6), 942-944.
15. Al-Halhouli A.T., Demming S., Feldmann M., Büttgenbach S., Kilani M. I., and Al-Salaymeh A (2008). Performance Characterization of a Miniature Spiral-Channel Viscous Pump, *Sensors and Actuators A*, 142 (1), 256-262.
16. Al-Halhouli A.T., Al-Salaymeh A., Kilani M. I., and Büttgenbach, S (2007). Numerical Investigation of the Effect of Spiral Curvature on the Flow Field in a Spiral-Channel Viscous Micropump, *Microfluidics Nanofluidics*, 3(5), 537-546.
17. Al-Halhouli A.T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S (2007). Investigation of the Influence of Design Parameters on the Flow Performance of Single and Double Disk Viscous Micropumps, *Microsystem Technologies*, 13 (7), 677-687.
18. Al-Halhouli A.T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S (2006). Influence of Geometrical Design Parameters on the Flow Performance of a Spiral Channel Viscous Micropump, *WSEAS Transactions on Fluid Mechanics*, 1 (6), 601-606.
19. Kilani M.I., Al-Salaymeh A., and Al-Halhouli A.T (2006). Effect of Channel Aspect Ratio on the Flow Performance of a Spiral-Channel Viscous Micropump, *Journal of Fluids Engineering, Transactions of the ASME*, 128 (3), 618-627.

Conferences papers

1. Al-Halhouli A.T., Mohsen M., Matar M., Dietzel A. and Büttgenbach S (2012). Design and Performance Evaluation of Passive Micromixers for a Wide Range of Low Reynolds Number flows. *Microfluidics Conference*, Heidelberg, Germany.
2. Munoz-Berbel X., Rodriguez-Rodriguez R., Demming S., Al-Halhouli A.T., Büttgenbach S., Verpoorte E., Ortiz P., Llobera A (2012). Biophotonic lab on a chip with integrated size-exclusion microfilters for cell proliferation monitoring. The Sixteenth International Conference on Miniaturized Systems for Chemistry and Life Sciences (μ TAS 2012), Okinawa, Japan.
3. Peterat G., Demming S., Schmolke H., Al-Halhouli A.T., Edlich A., Büttgenbach S., Klages C.-P., and Krull R. (2012) Multiphase Microbioreactors: Scaling Down Hydrodynamic Principles for Biological Process Intensification. *Microfluidics Conference*, Heidelberg, Germany.
4. Al-Halhouli A.T., Waldschik A., Kilani M. I., and Büttgenbach S. (2012) The Electromagnetic Driven Gentle Micropump, *ICTEA12*, Istanbul, Turkey.
5. Al-Halhouli A.T., Demming S., Alahmad L., Llobera A., and Büttgenbach S. (2011) Fabrication and Testing of an Optical Enzymatic Glucose Biosensor Based on

- External Immobilization on Micro-beads. *International Conference on Bio-Sensing Technology 2011*, Amsterdam, Netherlands.
6. Al-Halhouli A.T., Waldschik A., Kilani M. I., and Büttgenbach S. (2011) A Multifunction Pump Based on Microfabricated Electromagnetic Actuator, *Mikrosystemtechnik-Kongress 2011*, Darmstadt, Germany, 685-688.
 7. Al-Halhouli A.T. and Büttgenbach S. (2010) Numerical Analysis of Mixing in a Multifunction Electromagnetic Micropump, *ICNMM 2010*, Montreal, Canada. FEDSM-ICNMM2010-30971.
 8. Al-Halhouli A.T., Waldschik A., Kilani M. I., and Büttgenbach S. (2010) Gentle Micropump Based on Microelectromagnetic Actuator, *Nanotech 2010*, California, USA. 340-343.
 9. Al-Halhouli A.T. (2010) Highlights on Microfluidics for Energy Generation. *International Engineering Conference on Hot Arid Regions*, Saudia Arabia, 2010, 91-94.
 10. Al-Halhouli A.T. and Büttgenbach S. (2010) Numerical Visualization of Mixing in a Novel Electromagnetic Pump. *ICTEA10*, Marrakesh, 2010.
 11. Al-Halhouli A.T. (2010) Analysis on the Effect of Geometrical Design Parameters on Maximum Shear Stresses in an Electromagnetic Micropump. *MOEMS-MEMS 2010*, 7593, San Francisco, California, USA.
 12. Al-Halhouli A.T. (2009) Electromagnetic Field Analysis on a Novel Electromagnetic Actuator for Fluid Handling Applications. *PowerMEMS 2009*, Washington DC, USA. 308-311.
 13. Al-Halhouli A.T., Kilani M. I., and Büttgenbach S (2009).Development of a Novel Meso-Scale Electromagnetic Pump for Bio-medical Applications. *Procedia Chemistry*, 1(1), 349-352.
 14. Demming S., Balck A., Emeis R., Al-Halhouli A.T., and Büttgenbach S. (2009) PDMS Micro Components for Separation of Biomass in Lab-on-a-Chip Applications. *Mikrosystemtechnik Kongress 2009*, Berlin, Germany.
 15. Büttgenbach S., Balck A., Demming S., Lesche C., Michalzik M., and Al-Halhouli A.T. (2009) A Survey of Microfluidic Devices Fabrication Technology at the IMT, *ICTEA09*, Abu Dhabi, UAE.
 16. Al-Halhouli A.T., and Büttgenbach S (2009) Friction factor and Viscous Heating in Liquid Flows in Curved Microchannels, *ICTEA09*, Abu Dhabi, UAE.
 17. Balck A., Al-Halhouli A.T., and Büttgenbach S (2009), Separation of Red Blood Cells in Y-microchannels, *ICTEA09*, Abu Dhabi, UAE.
 18. Kilani M.I., Al-Halhouli A.T., Büttgenbach S (2009) Analytical and Numerical Simulations of the Flow Performance of a Ferrofluidic Magnetic Micropump for Particle-Laden Applications, *ICTEA09*, Abu Dhabi, UAE.
 19. Al-Halhouli A.T., and Büttgenbach S (2008) Fluid Flow in Curved Rectangular Microchannels, *International Conference on Nanotechnology*, Abu Dhabi, UAE.
 20. Al-Halhouli A.T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S (2008) The Spiral Channel Viscous Micropump. *Graduate Studies Research Conference*. Jordan.
 21. Al-Halhouli A.T., Kilani M. I., and Büttgenbach S (2008). CFD Simulations of Viscous Heating in a Spiral-Channel Micropump. *Micro/Nanoscale Heat Transfer International Conference*. Tainan, Taiwan.
 22. Kilani M. I., Al-Halhouli A.T., Galambos P. C., Al-Salaymeh A (2007). Design and Testing of a Surface Micromachined On-Chip Flat Disk Micropump. *The Sixth Jordanian International Mechanical Engineering Conference*, Jordan.

23. Al-Halhouli A.T., Kampen I., Krah T., Büttgenbach S (2007). Nanoindentation Testing of SU-8 Photoresist Mechanical Properties. *33rd International Conference on Micro- and Nano-Engineering*. Denmark, 61-62.
24. Al-Halhouli A.T., Kilani M. I., and Büttgenbach S (2007) Development and Testing of a Flat Disk Micropump. *18th Workshop on Micromachining, Micromechanics, and Microsystems*. Portugal, 155-158.
25. Amayreh M. I., Al-Salaymeh A., Kilani M. I., and Al-Halhouli A.T. (2007). Numerical Prediction of a Bi-Directional Micro Hot Wire Anemometer Using Three Parallel Wires. *The Third International Conference on Thermal Engineering: Theory and Applications*, Jordan.
26. Al-Halhouli A.T., Demming S., Feldmann M., Büttgenbach S., Kilani M. I., and Al-Salaymeh A (2006). Spiral-Channel Viscous Micropump- Experimental and Numerical Investigations. *Euroensors XX - 2006*, Sweden 38-39.
27. Al-Halhouli A.T., Kilani M. I., Amayreh M., Al-Salaymeh A., and Büttgenbach S (2006). Parametric study of Single Disk Viscous Micropump. *International Conference on Bio-Nanotechnology: Future Prospects in the Emirates*, UAE, 193-197.
28. Kilani M. I., Al-Halhouli A.T., Al-Salaymeh A., and Büttgenbach S (2006). Viscous Pumps-A review. *International Conference on Bio-Nanotechnology: Future Prospects in the Emirates*, UAE, 227-231.
29. Al-Halhouli A.T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S (2006). Effect of mean radius to channel width ratio on the flow performance of Spiral Channel Viscous Micropump. *The 4th WSEAS International Conference on Fluid Mechanics and Aerodynamics*, Greece.
30. Al-Halhouli A.T., Al-Salaymeh A., and Kilani, M. I (2006). Numerical Simulations of the Flow Field in a Viscous Spiral Micropump. *Proceeding of the 2nd International Conference on Thermal Engineering Theory and Applications*, UAE.
31. Al-Halhouli A.T., Alhusein M., Hammad M., and Al-Shannak B. (2005). Two-Phase Slug Flow Pressure Drop in a Tee-Junction, *The First Middle-East International Conference on Advances in Civil, Mechanical and Material Engineering*, Jordan.

Posters and Abstracts

1. Peterat G., Demming S., Schmolke H., Al-Halhouli A.T., Edlich A., Büttgenbach S., Klages C.-P., and Krull R (2012). Enhanced Mixing on Small Scales in Microfluidic Screening Bioreactors. *23rd North American Mixing Conference*, Mayan Riviera, Mexico.
2. Pretor, S., Finke, J.H., Al-Halhouli, A.T., Schmolke, H., Busker, M., Dietzel, A., Büttgenbach, S., Klages, C.-P., Behrends, S, Reichl, S., Müller-Goymann, C.C. (2012) Development of a Microfluidic System for Screening of Colloidal Drug Formulations under Flow Conditions. *DPhG-Jahrestagung*, Greifswald, Germany.
3. Büttgenbach S., Demming S., Waldschik A., and Al-Halhouli A.T. Elektromagnetische Mikroaktoren für Lab-on-Chip-Anwendungen (2012), *Heiligenstädter Kolloquium*.
4. Al-Halhouli A.T., Demming S., Alahmad L., Llobera A., and Büttgenbach S (2012). Optical Detection of Glucose Concentrations in a PDMS Enzymatic, *Lab-on-a-chip European congress*, Edinburgh, Scotland.
5. Al-Halhouli A.T., Demming S., Alahmad L., Llobera A., and Büttgenbach S (2011). In-Line Photonic Glucose Biosensor Using Integrated Microbeads, *International Conference on Nanotechnology*, Abu Dhabi, UAE.

6. Al-Halhouli A.T. (2009) Electromagnetic Field Analysis of Spiral Double Layer Electroplated Microcoils. The MEMS Alliance – Micro- and Nano- technology in the Green Revolution: Energy and Environmental Sensing, Washington DC, USA.
7. Al-Halhouli A.T., Kilani M. I., and Büttgenbach S (2009).Development of a Novel Meso-Scale Electromagnetic Pump for Bio-medical Applications. *Euroensors XXIII* 145, Lausanne, Switzerland.
8. Al-Halhouli A.T., Abdelhadi S., Kilani M.I., Büttgenbach S (2008) Influence of Shear Stresses on Biomedical Fluids in Microchannels. *Lab-on-a-Chip World Congress*. Barcelona, Spain.
9. Al-Halhouli A.T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S (2007). Micro-Scale Couette-Poiseuille Flow in Curved Microchannels. *Bulletin of the American Physical Society*, Salt Lake City, Utah, USA.
10. Al-Salaymeh A., Al-Halhouli A.T., Kilani M. I., and Büttgenbach S (2006). Parametric Effects on the Flow Performance of Single Disk Viscous Micropump. *Bulletin of the American Physical Society*, 51 (9), 27, Tampa Bay, Florid, USA.
11. Al-Halhouli A.T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S (2006). Analytical and Numerical Investigations of the Influence of the Geometrical Parameters on the Flow Performance of Spiral Channel Viscous Micropump. *Bulletin of the American Physical Society*, 51 (9), 137, Tampa Bay, Florid, USA.
12. Kilani M. I., Al-Salaymeh A., Al-Halhouli A.T., and Gad-el-Hak M. (2005). Effect of Aspect Ratio on the Performance of Spiral-Channel Viscous Micropump, *Bulletin of the American Physical Society*, 50(9), 273–274.

TEACHING

- Computational Fluid Dynamics (training course) 2006 – 2010
- Microfluidic Systems (Graduate and undergraduate course) 2009 – 2012
- Fundamentals of Microsystems (undergraduate course) 2010, 2012

TECHNICAL SKILLS

- Softwares and operating systems: AutoCAD, SolidWorks, CFD Fluent, ANSYS, the graphics editor CorelDRAW, Windows and Linux/Ubuntu.
- Programming: Matlab, C, LabView and Atmel AVR microcontroller.
- Microfabrication: Polymer micromachining and Soft lithography.

PROFESSIONAL SERVICE

Manuscripts reviewer for:

Microfluidics Nanofluidics, International Journal of Mechanical Engineering Education, International Journal of Applied Electromagnetics Mechanics, International Journal of Engineering, Energy conversion and management, Sensors & Actuators A.

Organizer of the Microfluidics/Nanofluidics and Life Science Applications session

- International Conference in Thermal Engineering (ICTEA09), Abu Dhabi, 2009.
- International Conference in Thermal Engineering (ICTEA10), Marrakesh, 2010.

Scientific committee member

- International Conference in Thermal Engineering (ICTEA10), Marrakesh, 2010.
- International Conference in Thermal Engineering (ICTEA12), Istanbul, 2012.

LANGUAGES: Arabic, English and German.

HOBBIES : Swimming, Table Tennis, Photographing and Biking.