

# Stanford

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## Mohammad Asif Zaman

Physical Science Research Scientist

W. W. Hansen Experimental Physics Laboratory

### Bio

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#### ACADEMIC APPOINTMENTS

- Physical Science Research Scientist, W. W. Hansen Experimental Physics Laboratory

#### HONORS AND AWARDS

- Teaching Fellowship, Stanford University (Sept. 2019)
- Centennial Teaching Assistant Award Winner, Stanford University (June, 2019)
- Robert S. Hilbert Memorial Optical Design Competition Winner, Synopsys (Aug, 2018)
- James F. Gibbons Outstanding Student Teaching Award in Electrical Engineering, Stanford University (June 18, 2017)
- Departmental Fellowship, Department of Electrical Engineering, Stanford University (Sept. 2014)

#### PROFESSIONAL EDUCATION

- MS, Bangladesh University of Engineering and Technology , Electrical and Electronic Engineering (2011)
- BS, Bangladesh University of Engineering and Technology , Electrical and Electronic Engineering (2009)

#### SERVICE, VOLUNTEER, AND COMMUNITY WORK

- Member, Technical Committee for evaluating radiation hazards from commercial roof-top cellphone towers in Bangladesh (2013)
- Guest Lecturer (2011 - 2012)
- Treasurer (January 2012 - December 2012)
- Member (2012)

#### LINKS

- My Website: <https://web.stanford.edu/~zaman/>
- Research group website: <https://hesselinkgroup.stanford.edu>
- Google scholar page: <https://scholar.google.com/citations?user=JdGaufUAAAAJ&hl=en&oi=ao>
- LinkedIn page: <https://www.linkedin.com/in/zaman13/>
- GitHub page: <https://github.com/zaman13>
- ORCID: <https://orcid.org/0000-0002-7295-2102>
- Web of science profile: <https://www.webofscience.com/wos/author/record/AAN-2099-2020>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

My research focuses on trapping and controlled manipulation of sub-micron sized particles. The work included modeling, fabrication and testing of chips that employ optical forces and/or dielectrophoretic forces to trap and transport nanoparticles. Our goal is to develop lab-on-a-chip systems for biomedical and chemical applications.

### PROJECTS

- Plasmonic trapping and manipulation of nanoparticles - Stanford University (9/1/2014 - present)
- Dielectrophoretic trapping - Stanford University (August 1, 2015 - present)
- Adjoint optimization - Stanford University (March 1, 2016 - December 1, 2016)
- Microfluidic system design for droplet generation - Stanford University (June 1, 2017 - present)
- On chip system for small volume biochemistry - Stanford University (June 1, 2017 - present)

## Publications

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### PUBLICATIONS

- **Dielectrophoretic bead-droplet reactor for solid-phase synthesis.** *Nature communications*  
Padhy, P., Zaman, M. A., Jensen, M. A., Cheng, Y. T., Huang, Y., Wu, M., Galambos, L., Davis, R. W., Hesselink, L.  
2024; 15 (1): 6159
- **Spectral tweezers: Single sample spectroscopy using optoelectronic tweezers.** *Applied physics letters*  
Zaman, M. A., Wu, M., Ren, W., Jensen, M. A., Davis, R. W., Hesselink, L.  
2024; 124 (7): 071104
- **Controlled Transport of Individual Microparticles Using Dielectrophoresis.** *Langmuir : the ACS journal of surfaces and colloids*  
Zaman, M. A., Padhy, P., Wu, M., Ren, W., Jensen, M. A., Davis, R. W., Hesselink, L.  
2022
- **Dynamically controllable plasmonic tweezers using C-shaped nano-engravings.** *Applied physics letters*  
Zaman, M. A., Hesselink, L.  
2022; 121 (18): 181108
- **Optoelectronic tweezers with a non-uniform background field** *APPLIED PHYSICS LETTERS*  
Zaman, M., Padhy, P., Cheng, Y., Galambos, L., Hesselink, L.  
2020; 117 (17)
- **Solenoidal optical forces from a plasmonic Archimedean spiral** *PHYSICAL REVIEW A*  
Zaman, M., Padhy, P., Hesselink, L.  
2019; 100 (1)
- **Fokker-Planck analysis of optical near-field traps.** *Scientific reports*  
Zaman, M. A., Padhy, P., Hesselink, L.  
2019; 9 (1): 9557
- **Solenoidal optical forces from a plasmonic Archimedean spiral.** *Physical review. A*  
Zaman, M. A., Padhy, P., Hesselink, L.  
2019; 100 (1)
- **Near-field optical trapping in a non-conservative force field.** *Scientific reports*  
Zaman, M. A., Padhy, P., Hesselink, L.  
2019; 9 (1): 649

- **Near-field optical trapping in a non-conservative force field** *SCIENTIFIC REPORTS*  
Zaman, M., Padhy, P., Hesselink, L.  
2019; 9
- **Extracting the potential-well of a near-field optical trap using the Helmholtz-Hodge decomposition** *APPLIED PHYSICS LETTERS*  
Zaman, M., Padhy, P., Hansen, P. C., Hesselink, L.  
2018; 112 (9)
- **Capturing range of a near-field optical trap** *PHYSICAL REVIEW A*  
Zaman, M., Padhy, P., Hesselink, L.  
2017; 96 (4)
- **Dielectrophoresis-assisted plasmonic trapping of dielectric nanoparticles** *PHYSICAL REVIEW A*  
Zaman, M. A., Padhy, P., Hansen, P. C., Hesselink, L.  
2017; 95 (2)
- **Impedance matching in optically induced dielectrophoresis: Effect of medium conductivity on trapping force.** *Applied physics letters*  
Zaman, M. A., Wu, M., Ren, W., Hesselink, L.  
2024; 125 (5): 051108
- **Microparticle electrical conductivity measurement using optoelectronic tweezers.** *Journal of applied physics*  
Ren, W., Zaman, M. A., Wu, M., Jensen, M. A., Davis, R. W., Hesselink, L.  
2023; 134 (11): 113104
- **Resolution improvement of optoelectronic tweezers using patterned electrodes.** *Applied physics letters*  
Zaman, M. A., Wu, M., Ren, W., Jensen, M. A., Davis, R. W., Hesselink, L.  
2023; 123 (4): 041104
- **Topological visualization of the plasmonic resonance of a nano C-aperture.** *Applied physics letters*  
Zaman, M. A., Ren, W., Wu, M., Padhy, P., Hesselink, L.  
2023; 122 (8): 081107
- **Plasmonic Response of Nano-C-apertures: Polarization Dependent Field Enhancement and Circuit Model** *PLASMONICS*  
Zaman, M., Hesselink, L.  
2022
- **Numerical Solution of the Poisson Equation Using Finite Difference Matrix Operators** *ELECTRONICS*  
Zaman, M.  
2022; 11 (15)
- **Modeling Brownian Microparticle Trajectories in Lab-on-a-Chip Devices with Time Varying Dielectrophoretic or Optical Forces.** *Micromachines*  
Zaman, M. A., Wu, M., Padhy, P., Jensen, M. A., Hesselink, L., Davis, R. W.  
2021; 12 (10)
- **Optimized Deep Reactive-Ion Etching of Nanostructured Black Silicon for High-Contrast Optical Alignment Marks** *ACS APPLIED NANO MATERIALS*  
Yusuf, M., Herring, G. K., Neustock, L., Zaman, M., Raghuram, U., Narasimhan, V. K., Chia, C., Howe, R. T.  
2021; 4 (7): 7047-7061
- **Microparticle transport along a planar electrode array using moving dielectrophoresis.** *Journal of applied physics*  
Zaman, M. A., Padhy, P., Ren, W., Wu, M., Hesselink, L.  
2021; 130 (3): 034902
- **Dynamically controlled dielectrophoresis using resonant tuning.** *Electrophoresis*  
Padhy, P., Zaman, M. A., Jensen, M. A., Hesselink, L.  
2021
- **iLabs as an online laboratory platform: A case study at Stanford University during the COVID-19 Pandemic**  
Zaman, M., Neustock, L., Hesselink, L.

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IEEE.2021: 1621-1629

- **Photonic radiative cooler optimization using Taguchi's method** *INTERNATIONAL JOURNAL OF THERMAL SCIENCES*  
Zaman, M.  
2019; 144: 21–26
- **Design of a high numerical aperture achromatic objective lens for endomicroscopy** *OPTICAL ENGINEERING*  
Zaman, M., Buyukalp, Y.  
2019; 58 (7)
- **In-plane near-field optical barrier on a chip** *OPTICS LETTERS*  
Padhy, P., Zaman, M., Hesselink, L.  
2019; 44 (8): 2061–64
- **A semi-analytical model of a near-field optical trapping potential well** *JOURNAL OF APPLIED PHYSICS*  
Zaman, M., Padhy, P., Hesselink, L.  
2017; 122 (16)
- **On the substrate contribution to the back action trapping of plasmonic nanoparticles on resonant near-field traps in plasmonic films** *OPTICS EXPRESS*  
Padhy, P., Zaman, M., Hansen, P., Hesselink, L.  
2017; 25 (21): 26198–214
- **Adjoint method for estimating Jiles-Atherton hysteresis model parameters** *JOURNAL OF APPLIED PHYSICS*  
Zaman, M. A., Hansen, P. C., Neustock, L. T., Padhy, P., Hesselink, L.  
2016; 120 (9)
- **Optimization of multilayer antireflection coating for photovoltaic applications** *OPTICS AND LASER TECHNOLOGY*  
Sikder, U., Zaman, M. A.  
2016; 79: 88-94
- **Application of Taguchi's method to optimize fiber Raman amplifier** *OPTICAL ENGINEERING*  
Zaman, M. A.  
2016; 55 (4)
- **Effect of Substrate in Optical Trapping of Metallic Nanoparticle on Nano Apertures and Engravings**  
Padhy, P., Hansen, P., Ryan, J., Zaman, M., Huang, T. W., Hesselink, L., IEEE  
IEEE.2016
- **Bouc-Wen hysteresis model identification using Modified Firefly Algorithm** *JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS*  
Zaman, M. A., Sikder, U.  
2015; 395: 229-233