

Naveen Kumar Elumalai
Research Active Lecturer
College of Engineering, IT and Environment



Research interests

Material Science and Nanotechnology, Functional Composites, Additive Manufacturing, Thin Film Devices, Solar Cells, Optoelectronics, Self-Cleaning Coatings, Electrospinning, Impedance Spectroscopy

Research Metrics

Citations - 2543
h-index 27
i10-index 45
(Source - Google Scholar, updated Oct 2020)

Employment

Lecturer - Mechanical Engineering

Research Active Lecturer
College of Engineering, IT and Environment
18 Jan 2021 → present

Lecturer

Curtin University Malaysia
Malaysia
1 Jun 2018 → 1 Jul 2020

Research Fellow

University of New South Wales
Kensington, Australia
1 Mar 2015 → 1 Feb 2018

Research Fellow

University of South Australia
Adelaide, Australia
1 Feb 2014 → 1 Feb 2015

Project Engineer

Wipro Technologies
India
1 Sep 2007 → 1 May 2009

Awards

Best Lecturer Students' Choice Award 2019 (Semester 2) – Curtin University, Malaysia
Best Lecturer Students' Choice Award 2019 (Semester 1) – Curtin University, Malaysia
Best Lecturer Students' Choice Award 2018 (Semester 2) – Curtin University, Malaysia
Best Paper Award (2018) – Awarded by MDPI, Switzerland for paper in Energies Journal
Prestigious NUS research Scholarship, National University of Singapore (2009 – 2013)
BE, Mech. Engineering, Anna University Rank 6 - among 5649 candidates from entire state (TN-India)
College Gold Medal (Rank 1 in Mechanical Department) – Panimalar Engineering College, Chennai, India

Significant Journal Publications

2 in Energy & Environmental Science (IF 33.2) (First author)

2 in ACS Applied Materials & Interfaces (IF 8.4)

2 in Nanoscale (IF 6.9)

1 in ACS Photonics (IF 7.1)

1 in Journal of Power Sources (IF 7.4)

9 in Solar Energy Materials & Solar Cells (IF 6)

4 in Electrochimica Acta (IF 5.3),

4 in Physical Chemistry Chemical Physics (IF 4.1)

3 in Organic Electronics (IF 3.5),

Total of 57 journal articles excluding conference (12 First-authored), (25 – Second authored), (30 – Corresponding Authored)

Research outputs

Advances in stable and flexible perovskite solar cells

Wali, Q., Iftikhar, F. J., Elumalai, N. K., Iqbal, Y., Yousaf, S., Iqbal, S. & Jose, R., May 2020, In : Current Applied Physics. 20, 5, p. 720-737 18 p.

Low-temperature processed efficient and colourful semitransparent perovskite solar cells for building integration and tandem applications

Upama, M. B., Mahmud, M. A., Yi, H., Elumalai, N. K., Conibeer, G., Wang, D., Xu, C. & Uddin, A., Feb 2019, In : Organic Electronics. 65, p. 401-411 11 p.

Progress in non-fullerene acceptor based organic solar cells

Duan, L., Elumalai, N. K., Zhang, Y. & Uddin, A., 2019, In : Solar Energy Materials and Solar Cells. 193, p. 22-65 44 p.

Enhanced electron transport enables over 12% efficiency by interface engineering of non-fullerene organic solar cells

Upama, M. B., Elumalai, N. K., Mahmud, M. A., Xu, C., Wang, D., Wright, M. & Uddin, A., 1 Dec 2018, In : Solar Energy Materials and Solar Cells. 187, p. 273-282 10 p.

Electrospun 3D composite nano-flowers for high performance triple-cation perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Pal, B., Jose, R., Upama, M. B., Wang, D., Goncales, V. R., Xu, C., Haque, F. & Uddin, A., 1 Nov 2018, In : Electrochimica Acta. 289, p. 459-473 15 p.

Data of chemical analysis and electrical properties of SnO₂-TiO₂ composite nanofibers

Bakr, Z. H., Wali, Q., Ismail, J., Elumalai, N. K., Uddin, A. & Jose, R., Jun 2018, In : Data in Brief. 18, p. 860-863 4 p.

Highly crystalline bilayer electron transport layer for efficient conjugated polymer solar cells

Xu, C., Wright, M., Elumalai, N. K., Mahmud, M. A., Wang, D., Upama, M. B., Haque, F. & Uddin, A., May 2018, In : Current Applied Physics. 18, 5, p. 505-511 7 p.

Passivation of interstitial and vacancy mediated trap-states for efficient and stable triple-cation perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Gonçales, V. R., Wright, M., Xu, C., Haque, F. & Uddin, A., 15 Apr 2018, In : Journal of Power Sources. 383, p. 59-71 13 p.

Annealing induced microstructure engineering of antimony tri-selenide thin films

Haque, F., Elumalai, N. K., Wright, M., Mahmud, M. A., Wang, D., Upama, M. B., Xu, C. & Uddin, A., Mar 2018, In : Materials Research Bulletin. 99, p. 232-238 7 p.

Tandem perovskite solar cells

Wali, Q., Elumalai, N. K., Iqbal, Y., Uddin, A. & Jose, R., Mar 2018, In : Renewable and Sustainable Energy Reviews. 84, p. 89-110 22 p.

Synergistic combination of electronic and electrical properties of SnO₂ and TiO₂ in a single SnO₂-TiO₂ composite nanofiber for dye-sensitized solar cells

Bakr, Z. H., Wali, Q., Ismail, J., Elumalai, N. K., Uddin, A. & Jose, R., 10 Feb 2018, In : *Electrochimica Acta*. 263, p. 524-532 9 p.

Adsorbed carbon nanomaterials for surface and interface-engineered stable rubidium multi-cation perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Zarei, L., Gonçalves, V. R., Wright, M., Xu, C., Haque, F. & Uddin, A., 2018, In : *Nanoscale*. 10, 2, p. 773-790 18 p.

Effect of annealing dependent blend morphology and dielectric properties on the performance and stability of non-fullerene organic solar cells

Upama, M. B., Elumalai, N. K., Mahmud, M. A., Wright, M., Wang, D., Xu, C. & Uddin, A., 2018, In : *Solar Energy Materials and Solar Cells*. 176, p. 109-118 10 p.

MoS₂ incorporated hybrid hole transport layer for high performance and stable perovskite solar cells

Wang, D., Elumalai, N. K., Mahmud, M. A., Yi, H., Upama, M. B., Chin, R. A. L., Conibeer, G., Xu, C., Haque, F. & Duan, L., 2018, In : *Synthetic Metals*. 246, p. 195-203 9 p.

Optimization of conjugated polymer blend concentration for high performance organic solar cells

Xu, C., Wright, M., Elumalai, N. K., Mahmud, M. A., Gonçalves, V. R., Upama, M. B. & Uddin, A., 2018, In : *Journal of Materials Science: Materials in Electronics*. 29, 19, p. 16437-16445 9 p.

Realizing 11.3% efficiency in PffBT4T-2OD fullerene organic solar cells via superior charge extraction at interfaces

Xu, C., Wright, M., Elumalai, N. K., Mahmud, M. A., Wang, D., Gonçalves, V. R., Upama, M. B., Haque, F., Gooding, J. J. & Uddin, A., 2018, In : *Applied Physics A: materials science and processing*. 124, 6, p. 1-11 11 p., 449.

V₂O₅-PEDOT: PSS bilayer as hole transport layer for highly efficient and stable perovskite solar cells

Wang, D., Elumalai, N. K., Mahmud, M. A., Wright, M., Upama, M. B., Chan, K. H., Xu, C., Haque, F., Conibeer, G. & Uddin, A., 2018, In : *Organic Electronics*. 53, p. 66-73 8 p.

Role of fullerene electron transport layer on the morphology and optoelectronic properties of perovskite solar cells

Upama, M. B., Elumalai, N. K., Mahmud, M. A., Wang, D., Haque, F., Gonçalves, V. R., Gooding, J. J., Wright, M., Xu, C. & Uddin, A., Nov 2017, In : *Organic Electronics*. 50, p. 279-289 11 p.

Organic solar cells with near 100% efficiency retention after initial burn-in loss and photo-degradation

Upama, M. B., Elumalai, N. K., Mahmud, M. A., Sun, H., Wang, D., Chan, K. H., Wright, M., Xu, C. & Uddin, A., 31 Aug 2017, In : *Thin Solid Films*. 636, p. 127-136 10 p.

Perovskite solar cells for roll-to-roll fabrication

Uddin, A., Mahmud, M. A., Elumalai, N. K., Wang, D., Upama, M. B., Wright, M., Chan, K. H., Haque, F. & Xu, C., 27 Jul 2017, In : *Renewable Energy and Environmental Sustainability*. 2, 5 p., 7.

Plasmonics in Organic and Perovskite Solar Cells: Optical and Electrical Effects

Chan, K., Wright, M., Elumalai, N., Uddin, A. & Pillai, S., 17 Mar 2017, In : *Advanced Optical Materials*. 5, 6, p. 1-19 19 p., 1600698.

Dark carrier dynamics and electrical characteristics of organic solar cells integrated with Ag-SiO₂ core-shell nanoparticles

Chan, K. H., Elumalai, N. K., Tayebjee, M. JY., Uddin, A. & Pillai, S., Jan 2017, In : *Synthetic Metals*. 223, p. 34-42 9 p.

Low temperature processed ZnO thin film as electron transport layer for efficient perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Chan, K. H., Wright, M., Xu, C., Haque, F. & Uddin, A., Jan 2017, In : *Solar Energy Materials and Solar Cells*. 159, p. 251-264 14 p.

A high performance and low-cost hole transporting layer for efficient and stable perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Gonçalves, V. R., Wright, M., Xu, C., Haque, F. & Uddin, A., 2017, In : Physical Chemistry Chemical Physics. 19, 31, p. 21033-21045 13 p.

Controlled nucleation assisted restricted volume solvent annealing for stable perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Haque, F., Wright, M., Xu, C. & Uddin, A., 2017, In : Solar Energy Materials and Solar Cells. 167, p. 70-86 17 p.

Controlled Ostwald ripening mediated grain growth for smooth perovskite morphology and enhanced device performance

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Puthen-Veetil, B., Haque, F., Wright, M., Xu, C., Pivrikas, A. & Uddin, A., 2017, In : Solar Energy Materials and Solar Cells. 167, p. 87-101 15 p.

High-efficiency semitransparent organic solar cells with non-fullerene acceptor for window application

Upama, M. B., Wright, M., Elumalai, N. K., Mahmud, M. A., Wang, D., Xu, C. & Uddin, A., 2017, In : ACS Photonics. 4, 9, p. 2327-2334 8 p.

High performance semitransparent organic solar cells with 5% PCE using non-patterned MoO₃/Ag/MoO₃ anode

Upama, M. B., Wright, M., Elumalai, N. K., Mahmud, M. A., Wang, D., Chan, K. H., Xu, C., Haque, F. & Uddin, A., 2017, In : Current Applied Physics. 17, 2, p. 298-305 8 p.

Interfacial engineering of electron transport layer using Caesium Iodide for efficient and stable organic solar cells

Upama, M. B., Elumalai, N. K., Mahmud, M. A., Wright, M., Wang, D., Xu, C., Haque, F., Chan, K. H. & Uddin, A., 2017, In : Applied Surface Science. 416, p. 834-844 11 p.

Interfacial engineering of hole transport layers with metal and dielectric nanoparticles for efficient perovskite solar cells

Wang, D., Chan, K. H., Elumalai, N. K., Mahmud, M. A., Upama, M. B., Uddin, A. & Pillai, S., 2017, In : Physical Chemistry Chemical Physics. 19, 36, p. 25016-25024 9 p.

Optical modelling of P3HT: PC₇₁ BM semi-transparent organic solar cell

Upama, M. B., Wright, M., Elumalai, N. K., Mahmud, M. A., Wang, D., Chan, K. H., Xu, C., Haque, F. & Uddin, A., 2017, In : Optical and Quantum Electronics. 49, p. 1-6 6 p., 28.

Photo-degradation of high efficiency fullerene-free polymer solar cells

Upama, M. B., Wright, M., Mahmud, M. A., Elumalai, N. K., Soufiani, A. M., Wang, D., Xu, C. & Uddin, A., 2017, In : Nanoscale. 9, 47, p. 18788-18797 10 p.

Solution-processed lithium-doped ZnO electron transport layer for efficient triple cation (Rb, MA, FA) perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Soufiani, A. M., Wright, M., Xu, C., Haque, F. & Uddin, A., 2017, In : ACS Applied Materials and Interfaces. 9, 39, p. 33841-33854 14 p.

Single vs mixed organic cation for low temperature processed perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Wright, M., Chan, K. H., Xu, C., Haque, F. & Uddin, A., 20 Dec 2016, In : Electrochimica Acta. 222, p. 1510-1521 12 p.

Hysteresis in organic-inorganic hybrid perovskite solar cells

Elumalai, N. K. & Uddin, A., Dec 2016, In : Solar Energy Materials and Solar Cells. 157, p. 476-509 34 p.

Analysis of burn-in photo degradation in low bandgap polymer PTB7 using photothermal deflection spectroscopy

Upama, M. B., Wright, M., Puthen-Veetil, B., Elumalai, N. K., Mahmud, M. A., Wang, D., Chan, K. H., Xu, C., Haque, F. & Uddin, A., 2016, In : RSC Advances. 6, 106, p. 103899-103904 6 p.

Enhanced stability of low temperature processed perovskite solar cells via augmented polaronic intensity of hole transporting layer

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Chan, K. H., Wright, M., Xu, C., Haque, F. & Uddin, A., 2016, In : *Physica Status Solidi - Rapid Research Letters*. 10, 12, p. 882-889 8 p.

Hysteresis and electrode polarization in normal and inverted hybrid perovskite solar cells

Elumalai, N. K., Mahmud, A., Wang, D., Wright, M., Upama, M. B., Chan, K. H., Xu, C. & Uddin, A., 2016, *IEEE Conference on Photovoltaic Specialists* . p. 764-767 4 p.

Open circuit voltage of organic solar cells: an in-depth review

Elumalai, N. K. & Uddin, A., 2016, In : *Energy and Environmental Science*. 9, 2, p. 391-410 20 p.

Optical Modelling of Semi-transparent OPV devices

Upama, M. B., Wright, M., Elumalai, N. K., Mahmud, M. A., Wang, D., Chan, K. H., Xu, C., Haque, F. & Uddin, A., 2016, *2016 International Conference on Numerical Simulation of Optoelectronic Devices (NUSOD)*. p. 45-46 2 p.

Perovskite solar cells: progress and advancements

Elumalai, N. K., Mahmud, M. A., Wang, D. & Uddin, A., 2016, In : *Energies*. 9, 11, p. 1-20 20 p., 861.

Simultaneous enhancement in stability and efficiency of low-temperature processed perovskite solar cells

Mahmud, M. A., Elumalai, N. K., Upama, M. B., Wang, D., Wright, M., Sun, T., Xu, C., Haque, F. & Uddin, A., 2016, In : *RSC Advances*. 6, 89, p. 86108-86125 18 p.

Stability of perovskite solar cells

Wang, D., Wright, M., Elumalai, N. K. & Uddin, A., 2016, In : *Solar Energy Materials and Solar Cells*. 147, p. 255-275 21 p.

p-CuO/n-Si heterojunction solar cells with high open circuit voltage and photocurrent through interfacial engineering

Masudy-Panah, S., Dalapati, G. K., Radhakrishnan, K., Kumar, A., Tan, H. R., Naveen Kumar, E., Vijila, C., Tan, C. C. & Chi, D., May 2015, In : *Progress in Photovoltaics: research and applications*. 23, 5, p. 637-645 9 p.

Metal oxide semiconducting interfacial layers for photovoltaic and photocatalytic applications

Elumalai, N. K., Vijila, C., Jose, R., Uddin, A. & Ramakrishna, S., 2015, In : *Materials for Renewable and Sustainable Energy*. 4, 3, 11.

Nanostructured Materials for Sustainable Energy

Subianto, S., Elumalai, N. K., Dutta, N. K. & Choudhury, N. R., Dec 2014, In : *Materials Australia*. p. 40-43 4 p.

Does carbon coating really improves the electrochemical performance of electrospun SnO₂ anodes?

Aravindan, V., Sundaramurthy, J., Elumalai, N. K., Kumar, P. S., Ling, W. C., von Hagen, R., Mathur, S., Ramakrishna, S. & Madhavi, S., 1 Mar 2014, In : *Electrochimica Acta*. 121, p. 109-115 7 p.

Effect of trap depth and interfacial energy barrier on charge transport in inverted organic solar cells employing nanostructured ZnO as electron buffer layer

Elumalai, N. K., Vijila, C., Jose, R., Jie, Z. & Ramakrishna, S., 2014, In : *International Journal of Nanotechnology*. 11, 1/2/3/4

Biological, Chemical, and Electronic Applications of Nanofibers

Elumalai, N. K., Nguyen*, L. TH., Chen*, S., Prabhakaran, M. P., Zong, Y., Vijila, C., Allakhverdiev, S. I. & Ramakrishna, S., Aug 2013, In : *Macromolecular Materials and Engineering*. p. 822-867 46 p.

Electrospun ZnO nanowire plantations in the electron transport layer for high-efficiency inverted organic solar cells

Elumalai, N. K., Jin, T. M., Chellappan, V., Jose, R., Palaniswamy, S. K., Jayaraman, S., Raut, H. K. & Ramakrishna, S., 2013, In : *ACS Applied Materials and Interfaces*. 5, 19, p. 9396-9404 9 p.

Engineering of binary metal oxide nanostructures for highly efficient and stable excitonic solar cells

ELUMALAI, NAVEEN. KUMAR., 2013, National University of Singapore.

Enhancing the stability of polymer solar cells by improving the conductivity of the nanostructured MoO₃ hole-transport layer

Elumalai, N. K., Saha, A., Chellappan, V., Rajan, J., Zhang, J. & Ramakrishna, S., 2013, In : Physical Chemistry Chemical Physics. 15, 18, p. 6831-6841 11 p.

Influence of trap depth on charge transport in inverted bulk heterojunction solar cells employing ZnO as electron transport layer

Elumalai, N. K., Vijila, C., Sridhar, A. & Ramakrishna, S., 2013, *2013 IEEE 5th International Nanoelectronics Conference (INEC)*. p. 346-349 4 p.

Random nanowires of nickel doped TiO₂ with high surface area and electron mobility for high efficiency dye-sensitized solar cells

Archana, PS., Elumalai, N. K., Vijila, C., Ramakrishna, S., Yusoff, MM. & Jose, R., 2013, In : Dalton Transactions. 42, 4, p. 1024-1032 9 p.

Relation between charge carrier mobility and lifetime in organic photovoltaics

Vijila, C., Singh, S. P., Williams, E., Sonar, P., Pivrikas, A., Philippa, B., White, R., Naveen Kumar, E., Gomathy Sandhya, S. & Gorelik, S., 2013, In : Journal of Applied Physics. 114, 18, 184503.

Simultaneous improvements in power conversion efficiency and operational stability of polymer solar cells by interfacial engineering

Elumalai, N. K., Vijila, C., Jose, R., Ming, K. Z., Saha, A. & Ramakrishna, S., 2013, In : Physical Chemistry Chemical Physics. 15, 43, p. 19057-19064 8 p.

Charge transport through electrospun SnO₂ nanoflowers and nanofibers: role of surface trap density on electron transport dynamics

Elumalai, N. K., Jose, R., Archana, P. S., Chellappan, V. & Ramakrishna, S., 2012, In : Journal of Physical Chemistry C. 116, 42, p. 22112-22120 9 p.

Effect of C₆₀ as an electron buffer layer in polythiophene-methanofullerene based bulk heterojunction solar cells

Elumalai, N. K., Yin, L. M., Chellappan, V., Jie, Z., Peining, Z. & Ramakrishna, S., 2012, In : Physica Status Solidi (a). 209, 8, p. 1592-1597 6 p.

High performance dye-sensitized solar cells with record open circuit voltage using tin oxide nanoflowers developed by electrospinning

Elumalai, N. K., Jose, R., Archana, PS., Vijila, C., Yusoff, MM. & Ramakrishna, S., 2012, In : Energy and Environmental Science. 5, 1, p. 5401-5407 7 p.

Rice grain-shaped TiO₂-CNT composite—A functional material with a novel morphology for dye-sensitized solar cells

Peining, Z., Nair, A. S., Shengyuan, Y., Shengjie, P., Elumalai, N. K. & Ramakrishna, S., 2012, In : Journal of Photochemistry and Photobiology A: Chemistry. 231, 1, p. 9-18 10 p.

Electrospun TiO₂ nanorods assembly sensitized by mercaptosuccinic acid-capped CdS quantum dots for solar cells

Nair, A. S., Shengyuan, Y., Peining, Z., Elumalai, N. K., Archana, P. S., Babu, V. J. & Ramakrishna, S., 2011, *2011 Saudi International Electronics, Communications and Photonics Conference (SIECPC)*. p. 1-4 4 p.

Morphological dependance of charge transport in nanostructured ZnO-based Dye Sensitized Solar Cells

Elumalai, N. K., Tan, M. J., Lee, J. X., Dolmanan, S., Lin, K. K., Bin, L., Nair, A. S., Chellappan, V. & Ramakrishna, S., 2011, *2011 Saudi International Electronics, Communications and Photonics Conference (SIECPC)*. p. 1-5 5 p.