Azhar Fakharuddin

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Research Interests (current)

- Interfaces and stability of perovskite solar cells
- Optical properties of mixed halide perovskites
- Light emitting diodes made of halide perovskites
- Nanostructures: designs and properties

Publication (Book Chapter)

- **Fakharuddin A**., and Schmidt-Mende L., Hybrid Organic/Inorganic and Perovskite Solar Cells. Haining T., Boschloo G., Hagfeldt A.,(Eds), ***Molecular Devices for Solar Energy Conversion and Storage***. *Springer* Singapore. ISBN 978-981-10-5923-0. DOI:10.1007/978-981-10-5924-7.

Selected Publications (Articles)

Over 20 research publications in the field of organic solar cells, particularly perovskite solar cells

Under review (* shows corresponding author)

25	Futscher M. H., Lee J. M., Wang T., **Fakharuddin A**., Schmidt-Mende L., Ehrler B., Quantification of Ion Migration in $CH_3NH_3PbI_3$ Perovskite Solar Cells by Transient Capacitance Measurements. ***Energy Envi. Sci.*** 2018 (submitted on 25.01.2018)
24	Clasen B. H., Sánchez R.S., **Fakharuddin A**., Mora-Seró I.,, Green Light-Emitting Diodes based on All-Inorganic Perovskite Nanoparticles (CsPbBr3) Synthesized at Room Temperature. Under review, ***ChemPlusChem***. (2018).
23	Wong K. K., **Fakharuddin A***., Ehrenreich P., Deckert T., Abdi-Jalebi M., Friend R., Schmidt-Mende L. Manipulating charge accumulation and transfer in hybrid perovskite solar cells: organic versus inorganic interfaces. (Under review at ***JPCL***). (Submitted on 15.1.2018)
22	Chawloon T. et al. Role of the Metal-Oxide Work Function on Photocurrent Generation in Hybrid Solar Cells. **Sci. Reports** (under final review). (Submitted in September 2017).
21	Nawaz A. and **Fakharuddin A***. et al. High performance perovskite solar cells via efficient pore-filling of TiO_2 nanorods and nanotubes. ***ACS Appl. Mater. Inter. 2018***. (under review)

Published

20	Tountas et al., A Silanol-Functionalized Polyoxometalate with Excellent Electron Transfer Mediating Behavior to ZnO and TiO_2 Cathode Interlayers for Highly Efficient and Extremely Stable Polymer Solar Cells. Accepted. J. Mater. Chem. C. DOI: 10.1039/C7TC04960A
19	**Fakharuddin A***, et al., Interfaces in perovskite solar cells. ***Adv. Energ. Mater.*** (2017), https://doi.org/10.1002/aenm.201700623 .
18	Nawaz. A and **Fakharuddin A***. et al., Insights into optoelectronic properties of anti-solvent treated perovskite films. ***J. Materials Science: Materials in Electronics.*** 1-7, 2017
17	Z. Bakar and **Fakharuddin A***. et al. Advances in hole transport materials engineering for stable and efficient perovskite solar cells. ***Nano Energy***, (2017), 34, 2017, 271–305.
16	Giacomo, F.D and **Fakharuddin A.** et al., "Flexible perovskite solar cells: Current trends and future perspectives." ***Energy & Environmental Science***, 2016 9 (10), 3007-3035.
15	N.A. Manshor, and **A. Fakharuddin**, et al. Humidity versus photo-stability of metal halide perovskite films in a polymer matrix. ***PCCP***. 18 (31), 21629-21639
14	**Fakharuddin A.,** et al. Research Update: Behind the high efficiency of hybrid perovskite solar cells. ***APL Materials***, 2016 4 (9), 091505.
13	Wali, Q., and **Fakharuddin, A.** et al. "Nanowire nanocomposite of SnO_2–TiO_2 by pore filling for efficient dye-sensitized solar cells." ***Solar Energy***. 132, 395-404. 2016.
12	Fakharuddin A, et al. "Solid state perovskite solar modules by vacuum-vapor assisted sequential deposition on Nd: YVO_4 laser patterned rutile TiO_2 nanorods". ***Nanotechnology***, 26, 494002.

11	Fakharuddin A, et al. " Vertical TiO_2 Nanorods as a Medium for Stable and High-Efficiency Perovskite Solar Modules" ***ACS Nano***, 9(8), 8420- 8429, 2015.
10	Wali Q.; **Fakharuddin** A.; R. Jose. (2015). Tin oxide as a photoanode for dye-sensitized solar cells: current progress and future challenges. ***J. Pow. Sources***. 2015. 293, 1039-1052.
9	Wali Q., & **Fakharuddin** A., et al. "One pot Synthesis of Multi-Functional Tin Oxide Nanostructures for High Efficiency Dye-Sensitized Solar Cells", ***J. Alloys & compounds***, 2015, 646, 32-39.
8	**Fakharuddin A**., et al. (2015) "Role of morphology and crystallinity of nanorods and planar electron transport layer on long term durable performance of perovskite solar cells" ***J. Pow. Sources***, 283, 61.
7	Ahmed I., & **Fakharuddin A**., et al., " Mesoporous titania–vertical nanorod films with interfacial engineering for high performance dye-sensitized solar cells", ***Nanotechnology*** .26 (150401). 2015.
6	**Fakharuddin**, A.; Brown T. M. Fabregat-Santiage F., R. Jose; Bisquert J., "A perspective on the commercial production of dye-solar modules". ***Energ. & Environ.* Sci**. 2014, 7, 3952.
5	**Fakharuddin**, A.; et al, "Charge transport in dye-solar cells stacks". **J. App. Phys**. 115(16), 2014.
4	**Fakharuddin**, A.; et al. Channeling of electron transport to improve collection efficiency in mesoporous TiO_2 dye sensitized solar cell stacks. **App. Phys. Lett**. 104, 053905 (2014).
3	Wali Q,and **Fakharuddin** A. et al. "Multichannel nanotubes of SnO2 by electrospinning for high efficiency dye-sensitized solar cells", ***J. Mat. Chem. A***. 2, 17427, 2014.
2	**Fakharuddin**, A.; et al, Probing Electron Lifetime and Recombination Dynamics in Large Area Dye-Sensitized Solar Cells by Electrochemical Impedance Spectroscopy, ***Adv. Mater. Res.*** Vol. 295 (2014) pp 553-558.
1	**Fakharuddin**, A.; et al, Standardization of photoelectrode area of dye-sensitized solar cells, R. ***RSC Advances***. **2013**, *3*, 2683-2689.

International presentations

Over 15 international conferences presentations including **4 invited talks**.

Invited talks

Title: "**Interfacial and bulk losses in perovskite solar cell**", Invited speaker at ICFMD 2017, Malaysia.
Title: "**Research and opportunities in Germany**" Talk for academic staff and postgraduates students at the Univ. Malaysia Pahang. 14.08.2017.
Title: **"Perovskite Solar Cells – Challenges and Perspectives"**. Invited Lecture at National Center for Physics Islamabad, Pakistan (16 September 2015).
Title: "**What is so special about perovskite solar cells**", lecture delivered at faculty of electrical engineering of the University of Rome Tor Vergata, Italy on December 2014.

Awards and Recognition (Selected)

- **Alexander von Humboldt Fellowship (2016 – 2018)**
- **Gold Medal**, PECIPTA-2015, product title, "World's Nanorod Solar Module – Material Fancy goes Reality". Kuala Lumpur Convention Center, Malaysia, December 2015.
- **1st place** at university level "Material Lecture Competition-2015", presentation title, "*Multichannel nanotubes for energy applications*"
- **Diamond + double Gold Medal**, British Invention show, Barbican Convention Center London, 2014. Product title, "*Solartins*"
- '**Erasmus Mundus Mobility with Asia- 2014'.** Awarded a 10-month mobility funding to Europe.
- **Gold Medal** ITEX 2014, Kuala Lumpur, product title, "*SnO2 nanotubes based dye-solar cells*"
- **Silver Medal**, MTE2013, PWTC Kuala Lumpur, product titile, "*Towards a dye-sensitized solar cell module*"
- **Silver Medal**, ITEX 2012, KLCC Kulala Lumpur Malaysia. product title, "*Third generation transparent solar cells*"
- **2nd Best Oral Presentation**, NCONT 2012- UMP, presentation title, "*Towards high efficiency dye-solar modules*"

Reviewer for peer reviewed journals

Reviewing jobs includes high impact peer reviewed journals such as Nanoscale, Scientific Reports, JPCL, Solar Energy, APL Materials, PCCP, Crystals, and Material Science and Engineering Reports.

Related Patents

1. Qamar wali, A. Fakharuddin, R. Jose, Z. M. M. Yusoff., "SnO_2 Multichannel nanotubes" , ***patent applied***, 2014.
2. R. Jose, A. Fakharuddin, Z. Khalidin, "Nanowires based dye-solar modules", ***patent applied***. 2014.
3. R. Jose, A. Fakharuddin, Z. Khalidin, M. M. Yusoff, " A dye sensitized solar cell device", **PI2013000529 (6 March 2013)**

Education and research experience

Alexander Von Humboldt Research Fellow (Interfaces in perovskite solar cells) — Since 1 August 2016 — Dept. of Physics, Univ. of Konstanz, Germany

Postdoctoral Research Fellow *(Organic solar cells)* — **1 June** 2015-May 2016 — Universiti Malaysia Pahang, Malaysia

Doctor of Philosophy (*Advanced Materials*) — Dec 2011-Jan 2015 — Universiti Malaysia Pahang, Malaysia
PhD thesis title: "**A DYE-SENSITIZED SOLAR CELL MODULE WITH ENHANCED CHARGE COLLECTION EFFICIENCY**".

Master of Engineering (*Electronic*) — Jul 2009-Sep 2011 — Universiti Malaysia Pahang, Malaysia

Bachelor of Engineering (*Electronic*) — Mar 2004-Aug 2008 — Mehran University of Engineering & Technology, Sindh, Pakistan