

# Fahhad H. Alharbi

## Contact & Personal info

<b>Address</b>	Electrical Engineering Department King Fahd University of Petroleum & Minerals Dhahran, Saudi Arabia
<b>Office</b>	KFUPM, Building 59, Room 1070
<b>Phone</b>	+966 13 860 2337
<b>E-mail</b>	<a href="mailto:fahhad.alharbi@kfupm.edu.sa">fahhad.alharbi@kfupm.edu.sa</a>

## Education

- **PhD** in Electrical Engineering (May 2004), **University of Colorado at Boulder**.
  - August 2001 – May 2004.
  - Thesis: *Carrier Space Separation Nonlinearity in Quantum Wells*.
  - Advisor: Dr. Frank S. Barnes.
  - Focus areas: Solid state physics, photonics, nonlinear optics, computational physics.
- **MS** in Electrical Engineering (January 2001), **King Fahd University of Petroleum and Minerals at Dhahran**.
  - August 1997 – January 2001 (Part time)
  - Thesis: *Implementation of a Full Vectorial Method of Lines Analysis in the Study of Metal Clad Rib Waveguide*.
  - Advisors: Dr. Samir Al-Bader and Dr. Hussain A. Al-Jamid.
  - Focus areas: Semiconductors, photonics, numerical methods.
- **BS** in Electrical Engineering (January 1997), **King Fahd University of Petroleum and Minerals at Dhahran**.
  - August 1993 – January 1997.

## Professional Career

### King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia

- *Electrical Engineering Department*
  - Associate Professor (**January 2019 – Present**)
- *K.A.CARE Energy Research & Innovation Center at Dhahran*
  - Research Fellow (**March 2019 – Present**)

### Hamad Bin Khalifa University, Doha, Qatar

- *College of Science and Engineering*
  - Associate Professor (**July 2015 – December 2018**)

- *Qatar Environment & Energy Research Institute*
  - Principal Investigator (**February 2014 – December 2018**)
  - Senior Scientist (**January 2012- February 2014**)

## IBM Inc., San Jose, CA United States

- *Almaden Research Center*
  - Visiting Scholar (**November 2008 – May 2010**)

## King Abdulaziz City for Science and Technology, Riyadh, Saudi Arabia

- *Energy Research Institute*
  - Associate Research Professor (**November 2010 – December 2012**)
- *Electronics, Communications, and Photonics Program*
  - Assistant Research Professor (**December 2005 – November 2010**)

## Saudi Aramco, Dhahran, Saudi Arabia

- *Computer and Communications Engineering Department*
  - Communication & Computer Specialist (**June 2004 – December 2005**)
  - In leave for advanced degree (**August 2001 – May 2004**)
  - Communication Engineer (**March 1997 – August 2001**)

## Other Professional Activities

### Professional societies

- **Secretary, The Education Society Chapter**  
*IEEE - Saudi Arabia Section (2004-2005)*

### Services on advisory and peer review panels

- **Chair, The Review Committee for the First National Survey on R&D and Innovation in the Kingdom of Saudi Arabia**  
*Saudi Arabia's National Science, Technology, and Innovation Plan Directorate (2011)*
- **Member, The Review Committee for Saudi Arabian Science & Technology Graduate Scholarship Program**  
*Saudi Arabia's National Science, Technology, and Innovation Plan Directorate (2011)*

## Teaching & Advising

### Taught courses

- **Advanced mathematics for scientists & engineers** (graduate)
- **Advanced numerical methods** (graduate)
- **Physical optics** (graduate)
- **General physics** (undergraduate)

## Graduate students

- **Faisal Mumtaz** (PhD, 2019)  
*“Efficient High-Order Methods for Atomistic Calculations”*
- **Ahmer AB Baloch** (PhD, 2019)  
*“Bifacial Solar Technology: A Multi-Scale Study from Design of Solar Cells to Performance Evaluation of Photovoltaics In-Field”*
- **Mohammed I Hossain** (PhD, 2016)  
*“Development of High Efficiency Methylammonium Lead Halide Perovskite Solar Cells Using Copper(I) Oxide and Spiro-OMETAD as Hole Transport Materials”*
- **Mohammad Kawwam** (PhD, 2014)  
*“Pulsed Laser Deposition and Structural Analysis of Crystalline CuO and GaN Thin Films”*

## Current Research Interests

- **Machine Learning in Computational Materials Designs:**
  - Multi-scale multi-objective inverse materials design,
  - Materials related machine-learning and data-mining techniques,
  - Applications: Solar energy & Topological materials,
- **Theoretical & Computational Physics:**
  - Developing and improving high-order methods tailored for atomic scale calculations,
  - Orbital free density functional theory,
  - The foundations of density functional theory,
  - Delayed interactions,
- **Solar Energy:**
  - Seeking new materials and concepts for photovoltaics,
  - Simulating the optical and transport behaviors in optoelectronics devices,
  - Exploring phenomena that can be used for solar energy applications.

## Grants

- **Light Management in Solar Cells using Fault-Tolerant Plasmonics and Metamaterials [MetaSol] (LPI)**
  - QNRF (NPRP 11S-0117-180330)
  - 750,000 USD
  - March 2019 – Feb 2023
- **Coherent Energy Transfer in Novel Excitonic Materials For Solar Energy Applications (PI)**
  - QNRF (NPRP X - 107 - 1 - 027)
  - 3,000,000 USD

- Sept 2015 – Aug 2020
- **CRANN-QEERI initiative for Solar Energy Harvesting Materials: CRAQSolar (PI)**
  - QNRF (NPRP 8 – 090 – 2 - 047)
  - 809,402 USD
  - Jan 2016 - Jan 2019
- **Studies of the Role of Electron Correlations in Potential-Matched Direct Non-Equilibrium solar refrigeration (PI)**
  - QNRF (NPRP 7 - 317 - 1 - 055)
  - 898,800 USD
  - Jul 2015 - Jun 2018
- **Real Space Orbital Free Density Functional Theory using Spectral Methods**
  - QEERI Seed Fund
  - 111,000 QAR
  - Nov 2013 - Nov 2015
- **Developing Transition Metal Dichalcogenide Based Alternative Absorbers (WS<sub>2</sub> & MoS<sub>2</sub>) for Cost Effective Photovoltaic Applications (LPI)**
  - QNRF (NPRP 6 - 931 - 2 - 382)
  - 1,046,400 USD
  - Nov 2013 - Jan 2018
- **Engineering of nano-structured solar cells (PI)**
  - Saudi NSTIP (11-ENE1474-02)
  - 1,869,000 SAR
  - Oct 2012 - Oct 2014
- **Alternative Materials for Solar Cells (LPI)**
  - KACST (31-542)
  - 1,000,000 SAR
  - June 2010 - May 2012

## Patents

1. FE Mellouhi, S Rashkeev, A Belaidi, B Merzougui, N Tabet, S Sanvito , and **FH Alharbi**, Intrinsic stability enhancement and ionic migration mitigation by fluorinated cations incorporation in Hybrid Lead Halide Perovskites. (US Patent) Filed on 20<sup>th</sup> March 2018. (US, 62/642910)
2. FE Mellouhi, H Park, S Sanvito, N Tabet, and **FH Alharbi**, Cesium-Niobium-Chalcogenide Compounds and Semiconductor Devices. (US Patent) Filed on 7<sup>th</sup> Feb. 2018. (US, 62/627494)
3. FE Mellouhi, H Park, S Sanvito, N Tabet, and **FH Alharbi**, Enhanced photovoltaic properties of Perovskite Oxychalcogenid. (US Patent) Filed on 9<sup>th</sup> May 2017. (US, 62/574842)

4. N Tabet, **FH Alharbi**, and MI Hossain, Hybrid (Organic-Inorganic) Perovskite-Based Solar Cell with a Copper Oxide as Hole Transport Material. (US20170324053A1). Granted on 9<sup>th</sup> Nov. 2017.
5. **FH Alharbi**, JD Bass, H-Ch Kim, and RD Miller, Method of forming nanostructures. (US 8394224 B2) Granted on 12<sup>th</sup> of March 2013.

## Publications

### Books

1. A Alheis, A Al-Shehri, MS Shawkath, and **FH Alharbi**, *Peak Oil: Challenges and Opportunities for the GCC Countries*, FAIR, Doha, (2015).

### Reviews

2. **FH Alharbi** and S Kais "Theoretical Limits of Photovoltaics Efficiency and Possible Improvements by Intuitive Approaches Learned from Photosynthesis and Quantum Coherence," *Renewable & Sustainable Energy Reviews*, Vol. 43, pp. 1073-1089, 2015. [online](#)
3. MI Hossain and **FH Alharbi** "Recent Advances in Alternative Materials Photovoltaics," *Materials Technology*, Vol. 28, No. 1&2, pp. 88-97, 2013. [online](#) (Published also by the publisher in *Energy Materials: Materials Science and Engineering for Energy Systems*, Vol. 8, No. 1, pp. 88-97).

### Book chapters

4. F El-Mellouhi, **F Alharbi**, C Motta, S Rashkeev, S Sanvito, and S Kais, "Toward the Computational design of Pb-free and stable hybrid materials for solar cells," in *Theoretical Modeling of Mixed Organic-Inorganic Perovskites for Photovoltaic Applications* Ed. G Giorgi and K Yamashita, CRC Press, pp. 135-164, 2017. [online](#)

### In journals

5. H Park, AAB Baloch, ET Bentría, SN Rashkeev, **FH Alharbi**, and FE Mellouhi, "Oxychalcogenide-Perovskite Solar Cells: A Multiscale Design," Accepted and to appear in *Energy Technology*, 2019. [online](#)
6. M Hezam, SMH Qaid, IM Bedja, **F Alharbi**, MK Nazeeruddin, and A Aldwayyan, "Synthesis of Pure Brookite Nanorods in a Nonaqueous Growth Environment," *Crystals*, Vol. 9, # 562, 2019. [online](#)
7. H Park, R Mall, **FH Alharbi**, S Sanvito, N Tabet, H Bensmail, and FE Mellouhi, "Learn and Match Molecular Cations for Perovskites," *Journal of Physical Chemistry A*, Vol. 123, pp. 7323-7334, 2019. [online](#)
8. H Rashid, KS Rahman, MI Hossain, AA Nasser, **FH Alharbi**, M Akhtaruzzaman, and N Amin, "Physical and electrical properties of molybdenum thin films grown by DC magnetron sputtering for photovoltaic application," *Results in Physics*, Vol. 14, 102515, 2019. [online](#)

9. F El-Mellouhi, ME Madjet, GR Berdiyrov, ET Bentría, SN Rashkeev, S Kais, A Akande, C Motta, S Sanvito, and **FH Alharbi**, "Enhancing the electronic dimensionality of hybrid organic–inorganic frameworks by hydrogen bonded molecular cations," *Materials Horizon*, Vol. 6, pp. 1187-1196, 2019. [online](#)
10. F El-Mellouhi, SN Rashkeev, A Marzouk, L Kabalan, A Belaidi, B Merzougui, N Tabet, and **FH Alharbi**, "Intrinsic Stability Enhancement and Ionic Migration Reduction by Fluorinated Cations Incorporated in Hybrid Lead Halide Perovskites," *Journal of Materials Chemistry C*. Vol. 7, pp. 5299-5306, 2019. [online](#)
11. H Park, R Mall, **FH Alharbi**, S Sanvito, N Tabet, H Bensmail, and F El Mellouhi "Exploring New Approaches towards the Formability of Mixed-Ion Perovskite by DFT and Machine Learning," *Physical Chemistry Chemical Physics*, Vol. 21, pp. 1078-1088, 2019. [online](#)
12. F Mumtaz, H Saidaoui, and **FH Alharbi**, "Efficient High Order Method for Differential Equations in Unbounded Domains using Generalized Coordinate Transformation," *Journal of Computational Physics*, Vol. 381, pp. 275-289, 2019. [online](#)
13. MT Ferdaous, SA Shahahmadi, P Chelvanathan, Md Akhtaruzzaman, **FH Alharbi**, K Sopian, SK Tiong, N Amin, "Elucidating the role of interfacial MoS<sub>2</sub> layer in Cu<sub>2</sub>ZnSnS<sub>4</sub> thin film solar cells by numerical analysis," *Solar Energy*, Vol. 178, pp. 162-172, 2019. [online](#)
14. AAB Baloch, **FH Alharbi**, G Grancini, MI Hossain, MK Nazeeruddin, and N Tabet, "Analysis of Photocarrier Dynamics at Interfaces in Perovskite Solar Cells by Time Resolved Photoluminescence," *Journal of Physical Chemistry C*, Vol. 122, pp. 26805-26815, 2018. [online](#)
15. M Farhat, S Guenneau, T Puvirajesinghe, and **FH Alharbi**, "Frequency domain transformation optics for diffusive photon density waves' cloaking," *Optics Express*, Vol. 26, pp. 24792-24803, 2018. [online](#)
16. MA Hossain, BA Merzougui, **FH Alharbi**, and N Tabet, "Electrochemical deposition of bulk MoS<sub>2</sub> thin films for photovoltaic applications," *Solar Energy Materials and Solar Cells*, Vol. 186, pp. 165-174, 2018. [online](#)
17. H Park, **FH Alharbi**, S Sanvito, N Tabet, and F El Mellouhi, "Searching for Photoactive Polymorphs of CsNbQ<sub>3</sub> (Q=O,S,Se,Te) with Enhanced Optical Properties and Intrinsic Thermodynamic Stabilities," *Journal of Physical Chemistry C*, Vol. 122, pp. 8814-8821, 2018. [online](#)
18. M Legesse, H Park, F El Mellouhi, SN Rashkeev, S Kais, and **FH Alharbi**, "Improved Photoactivity of Pyroxene Silicates by Cation Substitutions," *ChemPhysChem*, Vol. 19, pp. 943-953, 2018. [online](#)
19. MI Hossain, **FH Alharbi**, F El-Mellouhi, and Nouar Tabet, "Design Optimization of Solar Cell with Molybdenum Sulfide as Light Absorber," *Journal of Photonics for Energy*, Vol. 8, #025501, 2018. [online](#)

20. H Park, **FH Alharbi**, S Sanvito, N Tabet, and F El-Mellouhi, "Elucidating the Impact of Chalcogen Content on the Photovoltaic Properties of Oxychalcogenide Perovskites  $\text{NaMO}_{3-x}\text{Q}_x$  (M=Nb,Ta, and Q=S,Se,Te)," *ChemPhysChem*, Vol. 19, pp. 703-714, 2018. [online](#)
21. F Mumtaz and **FH Alharbi**, "Efficient Mapping of High Order Basis Sets for Unbounded Domains," *Communications in Computational Physics*, Vol. 24, pp. 69-85, 2018. [online](#)
22. R Al-Gaashani, S Radiman, B Aissa, **FH Alharbi**, and N Tabet, "Development of Microwave Susceptors Based on SiC Composites and their Application for a One-Step Synthesis of ZnO Nanostructures," *Ceramics International*, Vol. 44, pp. 7674-7682, 2018. [online](#)
23. Z Hu, GS Engel, **FH Alharbi**, and S Kais, "Dark states and delocalization: competing effects of quantum coherence on the efficiency of light harvesting systems," *Journal of Chemical Physics*, Vol. 148, #064304, 2018. [online](#)
24. A Baloch, SP Aly, MI Hossain, FE Mellouhi, N Tabet, and **FH Alharbi**, "Practical Efficiency Limit of Methylammonium Lead Iodide Perovskite ( $\text{CH}_3\text{NH}_3\text{PbI}_3$ ) Solar Cells," *The Journal of Physical Chemistry Letters*, Vol. 9, pp. 426-434, 2018. [online](#)
25. M Farhat, S Kais, and **FH Alharbi**, "Effect of Time-Delayed Feedback on the Interaction of a Dimer System with its Environment," *Scientific Reports*, Vol. 7, # 15468, 2017. [online](#) (Nature Publishing Group)
26. M Farhat, S Kais, and **FH Alharbi**, "Plasmonically Enhanced Schottky Photovoltaic Devices," *Scientific Reports*, Vol. 7, #14253, 2017. [online](#) (Nature Publishing Group)
27. A Baloch, SP Aly, MI Hossain, FE Mellouhi, N Tabet, and **FH Alharbi**, "Full Space Device Optimization for Solar Cells," *Scientific Reports*, Vol. 7, #11984, 2017. [online](#) (Nature Publishing Group)
28. ME Madjet, GR Berdiyrov, FE Mellouhi, **FH Alharbi**, AV Akimov, and S Kais, "Cation Effect on Hot Carrier Cooling in Halide Perovskite Materials," *The Journal of Physical Chemistry Letters*, Vol. 8, pp. 4439-4445, 2017. [online](#)
29. P Chelvanathan, SA Shahahmadi, F Arith, K Sobayel, M Aktharuzzaman, K Sopian, **FH Alharbi**, N Tabet, and N Amin, "Effects of RF magnetron sputtering deposition process parameters on the properties of molybdenum thin films," *Thin Solid Films*, Vol. 638, pp. 213-219, 2017. [online](#)
30. MI Hossain, A Bouselham, **FH Alharbi**, and N Tabet, "Computational Analysis of Temperature Effects on Solar Cells Efficiencies," *Journal of Computational Electronics*, Vol. 16, pp. 776-786, 2017. [online](#)
31. FE Mellouhi, A Akande, C Motta, SN Rashkeev, G Berdiyrov, ME Madjet, A Marzouk, ET Bentría, S Sanvito, S Kais, and **FH Alharbi**, "Solar cells materials by design: Hybrid pyroxene corner-sharing  $\text{VO}_4$  tetrahedral chains", *ChemSusChem*, Vol. 10, pp. 1931-1942, 2017. [online](#)

32. **FH Alharbi** and S Kais, "Kinetic energy density for orbital-free density functional calculations by axiomatic approach," International Journal of Quantum Chemistry, Vol. 117, #e25373, 2017. [online](#)
33. MA Hossain, R Al-Gaashani, H Hamoudi, MJF Al Marri, IA Hussein, A Belaidi, BA Merzougui, **FH Alharbi**, and N Tabet, "Controlled Growth of Cu<sub>2</sub>O Thin Films by Electrodeposition Approach," Materials Science in Semiconductor Processing, Vol. 63, pp. 203-211, 2017. [online](#)
34. M Legesse, F El Mellouhi, ET Bentría, ME Madjet, TS Fisher, S Kais, and **FH Alharbi**, "Reduced work function of graphene by metal adatoms," Applied Surface Science, Vol. 394, pp. 98-107, 2017. [online](#)
35. Y Zhang, A Wirthwein, **FH Alharbi**, GS Engel, and S Kais, "Dark States Enhance the Photocell Power via Phononic Dissipations," Physical Chemistry Chemical Physics, Vol. 18, pp. 31845-31849, 2016. [online](#)
36. F El-Mellouhi, ET Bentría, A Marzouk, SN Rashkeev, S Kais, and **FH Alharbi**, "Hydrogen Bonding: A Mechanism for Tuning Electronic and Optical Properties of Hybrid Organic – Inorganic Frameworks," NPJ Computational Materials, Vol. 2, #16035, 2016. [online](#) (Nature Publishing Group)
37. F El-Mellouhi, A Marzouk, ET Bentría, SN Rashkeev, S Kais, and **FH Alharbi**, "Hydrogen Bonding and Stability of Hybrid Organic-Inorganic Perovskites," ChemSusChem, Vol. 9, pp. 2648-2655, 2016. [online](#)
38. F El-Mellouhi, ET Bentría, SN Rashkeev, S Kais, and **FH Alharbi**, "Enhancing Intrinsic Stability of Hybrid Perovskite Solar Cell by Strong, yet Balanced, Electronic Coupling," Scientific Reports, Vol. 6, #30305, 2016. [online](#) (Nature Publishing Group)
39. HP Lüthi, S Heinen, G Schneider, A Glöss, MP Brändle, RA King, EP Knapp, **F Alharbi**, S Kais, "The quantum chemical search for novel materials and the issue of data processing: The InfoMol project," Journal of Computational Science, Vol. 15, pp. 65-73, 2016. [online](#)
40. A Sergeev, R Jovanovic, S Kais, and **FH Alharbi**, "On the divergence of gradient expansions for kinetic energy functionals in the potential functional theory," Journal of Physics A, Vol. 49, 285202, 2016. [online](#)
41. R Jovanovic, S Kais, and **FH Alharbi**, "Cuckoo Search Inspired Hybridization of the Nelder-Mead Simplex Algorithm Applied to Optimization of Multi-Junction and Split-Spectrum Solar Cells," Applied Mathematics & Information Sciences, Vol. 10, pp. 961-973, 2016. [online](#)
42. G Berdiyrov, F El-Mellouhi, M El-Amine Madjet, **FH Alharbi**, FM Peeters, S Kais, "Effect of halide-mixing on the electronic transmission in organometallic perovskites," Solar Energy Materials and Solar Cells, Vol. 148, pp. 2-10, 2016. [online](#)



43. G.R. Berdiyrov, F. El-Mellouhi, M.E. Madjet, **F.H. Alharbi**, and S.N. Rashkeev, "Electronic transport in organometallic perovskite  $\text{CH}_3\text{NH}_3\text{PbI}_3$ : the role of organic cation orientations," Applied Physics Letters, Vol. 108, #053901, 2016. [online](#)
44. SMH Qaid, MS Al Sobaie, MA Majeed Khan, IM Bedja, **FH Alharbi**, MK Nazeeruddin, AS Aldwayyan, "Band-gap tuning of lead halide perovskite using a single step spin-coating deposition process," Materials Letters, Vol. 164, pp. 498-501, 2016. [online](#)
45. **FH Alharbi**, S Rashkeev, F El-Mellouhi, HP Luthi, N Tabet, and S Kais, "An Efficient Descriptor Model for Designing Materials for Solar Cells," NPJ Computational Materials, Vol. 1, #15003, 2015. [online](#) (Nature Publishing Group)
46. A Sergeev, R Jovanovic, S Kais, and **FH Alharbi**, "Correction to kinetic energy density using exactly solvable model," Physica Scripta, Vol. 90, # 125401, 2015. [online](#)
47. MI Hossain, **FH Alharbi**, and N Tabet, "Copper Oxide as Inorganic Hole Transport Material for Lead Halide Perovskite Based Solar Cells of Enhanced Performance," Solar Energy, Vol. 120, pp. 370-380, 2015. [online](#)
48. S Rashkeev, F El Mellouhi, S Kais, and **FH Alharbi**, "Domain Walls Conductivity in Hybrid Organometallic Perovskites and Their Essential Role in  $\text{CH}_3\text{NH}_3\text{PbI}_3$  Solar Cell High Performance," Scientific Reports, Vol. 5, # 11467, 2015. [online](#) (Nature Publishing Group)
49. Carlo Motta, Fedwa El Mellouhi, Sabre Kais, Nouar Tabet, **FH Alharbi**, and Stefano Sanvito, "Revealing the role of organic cations in hybrid halide perovskites  $\text{CH}_3\text{NH}_3\text{PbI}_3$ ," Nature Communications, Vol. 6, #7026, 2015. [online](#) (Nature Publishing Group)
50. Y Zhang, S Oh, **FH Alharbi**, G Engel, and S Kais, "Delocalized Quantum States Enhance Photocell Efficiency," Physical Chemistry Chemical Physics, Vol. 17, pp. 5743-5750, 2015. [online](#)
51. QA Drmosh, MK Hossain, **FH Alharbi**, and N Tabet, "Morphological, Structural and Optical Properties of Silver Treated Zinc Oxide Thin Film," Journal of Materials Science: Materials in Electronics, Vol. 26, pp. 139-148, 2015. [online](#)
52. R Jovanovic, S Kais, and **FH Alharbi**, "Spectral Method for Solving the Non-Linear Thomas-Fermi Equation Based on Exponential Functions," Journal of Applied Mathematics, Vol. 2014, 168568, 2014. [online](#)
53. H Rashid, KS Rahman, MI Hossain, **FH Alharbi**, N Tabet, N Amin, "Prospects of molybdenum disulfide ( $\text{MoS}_2$ ) as an alternative absorber layer material in thin film solar cells from numerical modeling," Chalcogenide Letters, Vol. 11, 397-403, 2014. [online](#)
54. VU Nazarov, **FH Alharbi**, TS Fisher, and S Kais, "Time-dependent density functional theory of coupled electronic lattice motion in quasi-two-dimensional crystals," Physical Review B, Vol. 89, 195423, 2014. [online](#)

55. QA Drmosh, MK Hossain, **FH Alharbi**, and N Tabet, "Silver Nanoparticles on Zinc Oxide: An Approach to Plasmonic PV solar cell," *Advanced Materials Research*, Vol. 938, pp. 280-285, 2014. [online](#)
56. MI Hossain, A Bouselham, and **FH Alharbi**, "Optical concentration effects on conversion efficiency of a split-spectrum solar cell system," *Journal of Physics D*, Vol. 47, 075101, 2014. [online](#)
57. R Jovanovic, S Kais, and **FH Alharbi**, "Efficient method for localized functions using domain transformation and Fourier sine series," *Molecular Physics*, Vol. 112, pp. 762-769, 2014. [online](#)
58. P Serra, MA Carignano, **FH Alharbi**, and Sabre Kais, "Quantum Confinement and Negative Heat Capacity," *Europhysics Letters*, Vol. 104, 16004, 2013. [online](#) [arXiv](#)
59. S Alfihed, M Hossain, A Alharbi, A Alyamani, and **FH Alharbi** "PLD Grown Polycrystalline Tungsten Disulphide (WS<sub>2</sub>) Films for Photovoltaics," *Journal of Materials*, Vol. 2013, Art. 603648, 2013. [online](#)
60. **FH Alharbi** and S Kais "Quantum criticality analysis by finite size scaling and exponential basis sets," *Physical Review E*, Vol. 87, No. 4, Art. 043308, 2013. [online](#) [arXiv](#)
61. M Kawwam, **FH Alharbi**, T Kayed, A Aldwayyan, A Alyamani, N Tabet, and K Lebbou "Characterization of CuO(111)/MgO(100) films grown under two different PLD backgrounds," *Applied Surface Science*, Vol. 276, pp. 7-12, 2013. [online](#)
62. **FH Alharbi** "Full-vectorial meshfree spectral method for optical waveguides analysis," *IEEE Photonics Journal*, Vol. 5, No. 1, Art. 6600315, 2013. [online](#)
63. **FH Alharbi** "Carrier multiplication applicability for photovoltaics; a critical analysis," *Journal of Physics D*, Vol. 46, Art. 125102, 2013. [online](#)
64. M Kawwam, **F Alharbi**, A Aldwayyan, K Lebbou, "Morphological Study of PLD Grown CuO Films on SrTiO<sub>3</sub>, Sapphire, Quartz, and MgO Substrates," *Applied Surface Science*, Vol. 258, No. 24, pp. 9949-9953, 2012. [online](#)
65. **FH Alharbi** "Minimal perturbation approach implementation in spectral methods," *Applied Mathematics Letters*, Vol. 25, No. 10, pp. 1309-1314, 2012. [online](#)
66. JD Bass, X Ai, A Bagabas, PM Rice, T Topuria, JC Scott, **F Alharbi**, H-C Kim, RD Miller, and Q Song "An Efficient and Low-cost Method for the Purification of Colloidal Nanocrystals," *Angewandte Chemie*, Vol. 50, No. 29, pp. 6538-6542, 2011. [online](#)
67. JD Bass, CD Schaper, CT Rettner, N Arellano, **F Alharbi**, RD Miller, and H-C Kim "Transfer Molding of Nanoscale Oxides using Water-Soluble Templates," *ACS Nano*, Vol. 5, pp. 4065-4072, 2011. [online](#)
68. **F Alharbi**, JD Bass, A Salhi, and A Alyamani, H-C Kim, and RD Miller "Abundant non-toxic materials for thin film solar cells: Alternative to conventional materials," *Renewable Energy*, Vol. 36, pp. 2753-2758, 2011. [online](#)

69. **F Alharbi** "Predefined Exponential Basis Set for Half-Bounded Multi Domain Spectral Method," Applied Mathematics, Vol. 1, pp. 146-152, 2010. [online](#)
70. Q Song Q, X Ai, T Topuria, PM Rice, **F Alharbi**, A Bagabas, M Bahattab, JD Bass, H-C Kim, JC Scott, RD Miller, "Microwave-assisted synthesis of monodispersed CdTe nanocrystals," Chemical Communications, Vol. 46, pp. 4971-4973, 2010. [online](#)
71. **F Alharbi** "Meshfree Eigenstate Calculation of Arbitrary Quantum Well Structures," Physics Letters A, Vol. 374, No. 25, pp. 2501-2505, 2010. [online](#)
72. **F Alharbi** "Comparative Analysis of Spectral Methods in Half-Bounded Domains; Implementation of Predefined Exponential and Laguerre Basis Sets to Study Planar Dielectric and Plasmonic Waveguides," Optical & Quantum Electronics, Vol. 41, No. 10, pp. 751-760, 2009. [online](#)
73. **F Alharbi** and JC Scott, "Multi-domain spectral method for modal analysis of optical waveguide," Optical & Quantum Electronics, Vol. 41, No. 8, pp. 583-597, 2009. [online](#)
74. **F Alharbi** "An Explicit FDM Method Calculation of Nonparabolicity Effects in Energy States of Multiple Quantum Wells," Optical & Quantum Electronics, Vol. 40, No. 8, pp. 551-559, 2008. [online](#)
75. **F Alharbi** and FS Barnes "Carriers' Spatial Separation Nonlinearity in Quantum Wells," Journal of Modern Optics, Vol. 52, No. 16, pp. 2279-2292, 10 Nov. 2005. [online](#)

### Papers in peer-reviewed conferences

76. H Rashid, KS Rahman, MI Hossain, **FH Alharbi**, N Tabet, MA Islam, N Amin, "Effects of Sulfurization Time on MoS<sub>2</sub> Absorber Layer for Thin Films Solar Cells Applications," in the Proceedings of the 33<sup>rd</sup> European Photovoltaic Solar Energy Conference (EU PVSEC2017), Amsterdam, 25-29 Sept. 2017.
77. AAB Baloch, SP Aly, MI Hossain, R Jovanovic, N Tabet, and **FH Alharbi**, "Enhanced Perovskite Solar Cell Performance Using Full Space Device Optimization," in IEEE PVSC, Washington DC, USA, 25-30 June 2017, pp. 963-965, 2017. [online](#)
78. **FH Alharbi**, P Serra, MA Carignano, and S Kais, " Optoelectronics Properties Tunability by Controlled Deformation," Journal of Physics: Conference Series, Vol. 707, #012010, 2016. [online](#)
79. A Sergeev, **FH Alharbi**, R Jovanovic, and S Kais, "Convergent sum of gradient expansion of the kinetic-energy density functional up to the sixth order term using Pade approximant," Journal of Physics: Conference Series, Vol. 707, #012011, 2016. [online](#)
80. MI Hossain, **FH Alharbi**, and N Tabet, "Numerical Analysis of Hybrid Perovskite Solar Cells Using Inorganic Hole Conducting Material," in the Proceedings of the 42<sup>nd</sup> IEEE Photovoltaic Specialists Conference, New Orleans, June 14-19, 2015. [online](#)

81. MI Hossain, O Daif, N Amin, **FH Alharbi**, and N Tabet, "Numerical Optimization of Lead Free Perovskite Solar Cell," TMS Middle East - Mediterranean Materials Congress on Energy and Infrastructure Systems (MEMA 2015), pp. 335-338, 11-14 Jan., 2015. [online](#)
82. **FH Alharbi**, MI Hossain, and N Tabet, "Perovskite based solar cells: a milestone towards cheaper PV technology," The proceedings of the 3<sup>rd</sup> International Symposium on Environment-Friendly Energies and Applications (EFEA 2014), Paris, France, 19-21 November 2014. [online](#)
83. H Badri, **FH Alharbi**, and R Jovanovic, "Self-consistent approach to solving the 1D Thomas-Fermi equation using an exponential basis set," AIP Conference Proceedings of the 12<sup>th</sup> International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2014), Vol. 1648, #850095, 2015. [online](#) (22-28 Sept. 2014, Rhodes, Greece)
84. MI Hossain, A Boussselham, and **FH Alharbi**, "Numerical analysis of the temperature effects on single junction solar cells efficiencies," in Proceedings of the 39<sup>th</sup> IEEE Photovoltaic Specialists Conference, Tampa, FL, USA, June 16-21, pp. 779-781, 2013. [online](#)
85. MI Hossain, A Boussselham, and **FH Alharbi**, "Numerical analysis of the optical concentration effects on split-spectrum solar cell system," in Proceedings of the 39<sup>th</sup> IEEE Photovoltaic Specialists Conference, Tampa, FL, USA, June 16-21, pp. 1017-1020, 2013. [online](#)
86. **FH Alharbi**, QA Drmosh, and N Tabet, "Metallic Quantum Dots as Sensitizers for Solar Cells," in Proceedings of the 39<sup>th</sup> IEEE Photovoltaic Specialists Conference, Tampa, FL, USA, June 16-21, pp. 993-996, 2013. [online](#)
87. MK Hossain, QA Drmosh, **F Alharbi**, and N Tabet, "Fabrication of Silver Nanoparticles on Zinc Oxide: An Approach to Plasmonic PV solar cell," in the Proceedings of International Conference on nanomaterials; Science, Technology, and Applications, pp. 92-97, 2013.
88. S Alfihed, M Hossain, A Alharbi, A Alyamani, and **FH Alharbi** "Low temperature PLD growth of a polycrystalline WS<sub>2</sub> for photovoltaics," in the Proceedings of the 22<sup>nd</sup> Photovoltaics Science and Engineering Conference, China, 5-9 Nov., pp. 3-0-39, 2012.
89. **F Alharbi** "Alternative Simple Approaches to Handle Internal and External Boundary Conditions and Their Implementations in Spectral Methods to Analyze Optoelectronics," in the Proceedings of 2011 International Conference on Numerical Analysis & Optimization - Theory and Applications (2011 NAOTA) 18-19 December 2011, Dhahran, Saudi Arabia, NA-22 p. 1-2.
90. M Kawwam, J Kim, A Aldwayyan, **F Alharbi**, and K Lebbou, "Morphology Optimization of PLD-grown CuO Films for Solar Energy Devices," in the Proceedings

- of the First Euro-Mediterranean Conference on Materials and Renewable Energies (EMCMRE-1) 21-25 November 2011, Marrakesh, Morocco, p. 24.
91. **F Alharbi**, Abdulmajeed Salhi, and Ahmad Alyamani, "Comparative analysis of non-toxic abundant materials for photovoltaics applications", in the Proceedings of the Eleventh World Renewable Energy Congress Proceeding, Abu Dhabi, Sept. 25-30, pp. 961-966, 2010.
  92. **F Alharbi** "Pseudospectra Implementation in Multi-Domain Spectral Method," in the Proceeding of The Second International Conference on Computer Research and Development (ICCRD-2010), Kuala Lumpur, Malaysia, May 7-10, pp. 526-529, 2010. [online](#)
  93. **F Alharbi** "Three Dimensional Mesh-Free Spectral Method Analysis of Optical Structures," in the Proceeding of The Second International Conference on Computer Research and Development (ICCRD-2010), Kuala Lumpur, Malaysia, May 7-10, pp. 522-525, 2010. [online](#)
  94. **F Alharbi** and JC Scott, "Mesh-free Spectral Method Analysis of Optical Waveguides and Wave Propagation," in IEEE Proceedings of the 9<sup>th</sup> International Conference on Numerical Simulation of Optoelectronic Devices, NUSOD09, Gwangju, Korea, Sept. 14 - 18, 2009, pp.107-108. [online](#)
  95. **F Alharbi** "Predefined exponential basis set for half-bounded multi domain spectral method," in IEEE Proceedings of the 9<sup>th</sup> International Conference on Numerical Simulation of Optoelectronic Devices, NUSOD09, Gwangju, Korea, Sept. 14 - 18, 2009, pp.77-78. [online](#)

### Scientific Reports

96. **F Alharbi** and F Alhargan "Peak oil and Saudi Arabia; Challenges and Opportunities," KACST Internal Report, Oct. 2008.