Curriculum Vitae
Koushik Biswas, Ph.D.

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CURRENT POSITION

Associate Professor of Physics, Arkansas State University

EDUCATION

2007	PhD (Physics), Texas Tech University, Lubbock, TX
1999	MSc. (Physics) Jadavpur University, Calcutta, India
1997	BSc. (Physics) Kharagpur College, Kharagpur, India

POSTDOCTORAL TRAINING

7/2010 – 8/2012	Postdoctoral Researcher, Advanced Materials Group, Oak RidgeNational Laboratory (ORNL)
8/2007 – 7/2010	Postdoctoral Researcher, Solid State Theory Group, National RenewableEnergy Laboratory (NREL)

APPOINTMENT

7/2017 – present	Associate Professor of Physics (tenured), Arkansas State University, Jonesboro
8/2012 – 6/2017	Tenure Track Assistant Professor of Physics, Arkansas State University, Jonesboro

RESEARCH INTERESTS

We focus on first-principles based computational investigation and development of electronic materials. They include bulk, low-dimensional materials and heterostructures that are important in photovoltaics, photocatalysis, light emitting devices, and radiation detection. We strive to maintain collaborative efforts with experimental researchers working in similar fields.

PEER-REVIEWED PUBLICATIONS

1. **K. Biswas**, "Revisiting the origin of green emission in Cs_4PbBr_6", Mater. Adv. **3**, 6791-6798 (2022). https://doi.org/10.1039/D2MA00544A
2. D. Yang, Y. Fu, Y. Sun, Y. Li, K. Wang, Z. Xiao, **K. Biswas**, and L. Zhang, "Phase transition pathway of hybrid halide perovskites under compression: Insights from first-principles calculations", *Phys. Rev. Materials* **5**, 054603 (2021). https://doi.org/10.1103/PhysRevMaterials.5.054603
3. X. Wang, T. Li, B. Xing, M. Faizan, **K. Biswas**, and L. Zhang, "Metal Halide Semiconductors beyond Lead-Based Perovskites for Promising Optoelectronic Applications", *J. Phys. Chem. Lett.* **12**, 10532 (2021). https://doi.org/10.1021/acs.jpclett.1c02877
4. Y. Sun, Y. Li, T. Li, **K. Biswas**, A. Patanè, and L. Zhang, "New Polymorphs of 2D Indium Selenide with Enhanced Electronic Properties", *Advanced Functional Materials* **30**, 2001920 (2020). https://doi.org/10.1002/adfm.202001920
5. Q. Xu, A. Stroppa, J. Lv, X. Zhao, D. Yang, **K. Biswas**, and L. Zhang, "Impact of organic molecule rotation on the optoelectronic properties of hybrid halide perovskites", *Phys. Rev. Materials* **3**, 125401 (2019). https://doi.org/10.1103/PhysRevMaterials.3.125401
6. X. Wang, Z. Liu, X-G. Zhao, J. Lv, **K. Biswas**, and L. Zhang, "Computational Design of Mixed-valence Tin Sulfides as Solar Absorbers", *ACS Applied Materials & Interfaces* **11**, 24867 (2019). https://doi.org/10.1021/acsami.9b01223
7. B. Kang and **K. Biswas**, "Exploring Polaronic, Excitonic Structures and Luminescence in $Cs_4PbBr_6/CsPbBr_3$", *J. Phys. Chem. Lett*. **9**, 830 (2018). https://dx.doi.org/10.1021/acs.jpclett.7b03333
8. Z. Ran, X. Wang, Y. Li, D. Yang, X-G Zhao, **K. Biswas**, D. J. Singh, and L. Zhang, "Bismuth and antimony-based oxyhalides and chalcohalides as potential optoelectronic materials", *npj Computational Materials* **4**, 14 (2018). https://dx.doi.org/10.1038/s41524-018-0071-1
9. Y. Sun, S. Luo, X-G Zhao, **K. Biswas**, S-L Li, and L. Zhang, "InSe: a two-dimensional material with strong interlayer coupling", *Nanoscale* **10**, 7991 (2018). https://dx.doi.org/10.1039/C7NR09486H
10. B. Kang, Q. Feng, and **K. Biswas**, "Comparative study of perovskite-type scintillator materials $CsCaI_3$ and $KCaI_3$ via first-principles calculations", *J. Phys. D: Appl. Phys*. **51**, 065303 (2018). https://dx.doi.org/10.1088/1361-6463/aaa17a
11. B. Kang and **K. Biswas**, "Shallow trapping vs. deep polarons in a hybrid lead halide perovskite, $CH_3NH_3PbI_3$", *Physical Chemistry Chemical Physics* **19**, 27184 (2017). http://dx.doi.org/10.1039/C7CP04417H
12. B. Kang and **K. Biswas**, "Preferential $CH_3NH_3^+$ Alignment and Octahedral Tilting Affect Charge Localization in Cubic Phase $CH_3NH_3PbI_3$", *J. Phys. Chem. C* **121**, 8319 (2017). http://dx.doi.org/10.1021/acs.jpcc.7b01184
13. Q. Feng, R. Noumbissi, **K. Biswas**, and H. Koizumi , "The Role of Hydroxyl Groups in Inter-Chain Interactions in Cellulose I_α and I_β", *Int. J. Quantum Chem.* **117**, e25357 (2017). https://doi.org/10.1002/qua.25357
14. B. Kang, Q. Feng, C. Summers, C. M. Fang, R. Adhikari, and **K. Biswas**, "Emerging New Pseudobinary and Ternary Halides as Scintillators for Radiation Detection" *IEEE Transactions on Nuclear Science* **64**, 1817 (2017). https://doi.org/10.1109/TNS.2016.2632064

15. Q. Feng and **K. Biswas**, "Ramifications of codoping SrI_2:Eu with isovalent and aliovalent impurities", *Journal of Applied Physics* **120**, 213104 (2016). http://dx.doi.org/10.1063/1.4971180
16. B. Kang, C. M. Fang, and **K. Biswas**, "A first-principles based study of ns^2 containing ternary iodides and their possibility of scintillation", *J. Phys. D: Appl. Phys*. **49**, 395103 (2016). http://dx.doi.org/10.1088/0022-3727/49/39/395103
17. B. Kang and **K. Biswas**, "Carrier Self-trapping and Luminescence in Intrinsically Activated Scintillator: Cesium Hafnium Chloride (Cs_2HfCl_6)" *J. Phys. Chem. C* **120**, 12187 (2016). http://dx.doi.org/ 10.1021/acs.jpcc.6b02496
18. C. M. Fang and **K. Biswas**, "Quaternary iodides A(Ba,Sr)I_5:Eu^{2+} (A=K, Cs) as scintillators for radiation detection" *J. Phys. Chem. C* **120**, 1225 (2016). http://dx.doi.org/10.1021/acs.jpcc.5b10690
19. C. M. Fang and **K. Biswas**, "Preferential Eu site occupation and its consequences in the ternary luminescent halides AB_2I5:Eu^{2+} (A=Li-Cs; B=Sr,Ba)" *Phys. Rev. Appl.* **4**, 014012 (2015). https://doi.org/10.1103/PhysRevApplied.4.014012
20. R. Adhikari, Q. Li, R. Williams, A. Burger, and **K. Biswas**, "DX-like centers in NaI:Tl upon aliovalent codoping" *Journal of Applied Physics* **116**, 223703 (2014). http://dx.doi.org/10.1063/1.4903766
21. M.-H. Du and **K. Biswas**, "Electronic structure engineering of elpasolites: Case of Cs_2AgYCl_6", *Journal of Luminescence* **143**, 710 (2013). http://dx.doi.org/10.1016/j.jlumin.2013.05.033
22. **K. Biswas**, M.-H. Du, and D. J. Singh "Electronic structure and defect properties of Tl_6SeI_4: Density functional calculations" *Physical Review B* **86**, 144108 (2012). http://dx.doi.org/10.1103/PhysRevB.86.144108
23. **K. Biswas** and M.-H. Du, "Energy transport and scintillation of Cerium doped elpasolite Cs_2LiYCl_6: hybrid density functional calculations" *Physical Review B* **86**, 014102 (2012). http://dx.doi.org/10.1103/PhysRevB.86.014102
24. **K. Biswas** and M.-H. Du, "Causes of high resistivity in CdTe" *New Journal of Physics* **14**, 063020 (2012). http://dx.doi.org/10.1088/1367-2630/14/6/063020
25. **K. Biswas**, M.-H. Du, J. T-Thienprasert, S. Limpijumnong, and D. J. Singh, Comment on "Uncovering the complex behavior of hydrogen in Cu_2O" *Physical Review Letters* **108**, 219703 (2012). http://dx.doi.org/10.1103/PhysRevLett.108.219703
26. G. Trimarchi, H. Peng, J. Im, A. J. Freeman, V. Cloet, A. Raw, K. R. Poeppelmeier, **K. Biswas**, S. Lany, and A. Zunger, "Using design principles to systematically plan the synthesis of hole-conducting transparent oxides: Cu_3VO_4 and Ag_3VO_4 as a case study", *Physical Review B* **84**, 165116 (2011). http://dx.doi.org/10.1103/PhysRevB.84.165116
27. M.-H. Du and **K. Biswas**, "Anionic and hidden hydrogen in ZnO", *Physical Review Letters* **106**, 115502 (2011). http://dx.doi.org/10.1103/PhysRevLett.106.115502
28. **K. Biswas** and M.-H. Du, "AX centers in II-VI semiconductors: Hybrid Functional Calculations", *Applied Physics Letters* **98**, 181913 (2011). http://dx.doi.org/10.1063/1.3583661
29. **K. Biswas** and M.-H. Du, "First principles study of native defects in InI", *Journal of Applied Physics* **109**, 113518 (2011). http://dx.doi.org/10.1063/1.3592231
30. **K. Biswas**, S. Lany, and A. Zunger, "The electronic consequences of multivalent elements in inorganic solar absorbers: Multivalency of Sn in Cu_2ZnSnS_4", *Applied Physics Letters* **96**, 201902 (2010). http://dx.doi.org/10.1063/1.3427433

31. M. Beekman, E. N. Nenghabi, **K. Biswas**, C. W. Myles, M. Baitinger, Y. Grin, and G. S. Nolas, "Framework Contraction in Na-Stuffed Si(cF 136)", *Inorganic Chemistry* **49**, 5338 (2010). http://dx.doi.org/10.1021/ic1005049
32. **K. Biswas** and S. Lany, "Energetics of quaternary III-V alloys described by incorporation and clustering of impurities", *Physical Review B* **80**, 115206 (2009). http://dx.doi.org/10.1103/PhysRevB.80.115206
33. **K. Biswas**, A. Franceschetti, and S. Lany, "Generalized valence-force-field model of (Ga,In)(N,P) ternary alloys", *Physical Review B* **78**, 085212 (2008). http://dx.doi.org/10.1103/PhysRevB.78.085212
34. **K. Biswas**, C. W. Myles, M. Sanati, and G. S. Nolas "Thermal properties of guest-free Si_{136} and Ge_{136} clathrates: A first-principles study", *Journal of Applied Physics* **104**, 033535 (2008). http://dx.doi.org/10.1063/1.2960580
35. **K. Biswas** and C. W. Myles, "Electronic and vibrational properties of framework-substituted type-II Si clathrates", *Physical Review B* **75**, 245205 (2007). http://dx.doi.org/10.1103/PhysRevB.75.245205
36. **K. Biswas** and C. W. Myles, "Density-functional investigation of $Na_{16}A_8Ge_{136}$(A=Rb,Cs)clathrates", *Journal of Physics: Condensed Matter* **19**, 466206 (2007). http://dx.doi.org/10.1088/0953-8984/19/46/466206
37. C. W. Myles, **K. Biswas**, and E. Nenghabi, "Rattling guest impurities in Si and Ge clathrate semiconductors", *Physica B* **401**, 695 (2007). http://dx.doi.org/10.1016/j.physb.2007.09.054
38. **K. Biswas**, S. Gangopadhyay, H. C. Kim, and R. D. Miller, "Nanoporous organosilicate films as antireflection coatings", *Thin Solid Films* **514**, 350 (2006). http://dx.doi.org/10.1016/j.tsf.2006.02.087
39. **K. Biswas** and C. W. Myles, "Electronic properties of the $Na_{16}Rb_8Si_{136}$and $K_{16}Rb_8Si_{136}$clathrates", *Physical Review B* **74**, 115113 (2006). http://dx.doi.org/10.1103/PhysRevB.74.115113

PEER-REVIEWED PROCEEDINGS

1. Q. Li, R. T. Williams, A. Burger, R. Adhikari, and **K. Biswas**, "Search for improved-performance scintillator candidates among the electronic structures of mixed halides", *Invited Paper*, *Proceedings of SPIE* **9213**, 92130M (2014). http://dx.doi.org/10.1117/12.2063583
2. M.-H. Du, **K. Biswas**, and D. J. Singh, "Electronic structure, energy transport, and optical properties of halide scintillators", *Proceedings of SPIE* **8507**, 850705 (2012). http://dx.doi.org/10.1117/12.929131
3. M.-H. Du, **K. Biswas**, and D. J. Singh, "Resistivity, carrier trapping, and polarization phenomenon in semiconductor radiation detection materials", *Proceedings of SPIE* **8507**, 85070M (2012). http://dx.doi.org/10.1117/12.930072
4. S. Gangopadhyay, J. A. Lubguban, B. Lahlouh, G. Sivaraman, **K. Biswas**, T. Rajagopalan, N. Biswas, H.-C. Kim, W. Volksen, and R. D. Miller, "Supercritical CO_2 Treatments for Semiconductor Applications", *MRS Proceedings* **812**, F4.6 (2004). http://dx.doi.org/10.1557/PROC-812-F4.6

BOOK CHAPTER

"Perovskites – Revisiting the venerable ABX_3 family with organic flexibility and new applications", J. Xu, David L. Carroll, **K. Biswas**, F. Moretti, S. Gridin, and R. T. Williams, book chapter in *Optical Properties of Materials and Their Applications, 2nd Ed* (Wiley, 2020). https://doi.org/10.1002/9781119506003.ch18

INVITED PRESENTATIONS

1. **K. Biswas** (2019) "Hybrid and All-Inorganic Perovskite Halides: A First-Principles Perspective", Condensed Matter Seminar, Department of Physics & Astronomy, Texas A&M University, College Station, TX.
2. **K. Biswas** (2018) "Structural and property trends among low-dimensional halide perovskites", Seminar, Department of Physics and Materials Science, University of Memphis, TN.
3. **K. Biswas** (2018) "A brief perspective on halides as optoelectronic materials", Seminar, College of Materials Science & Engineering, Jilin University, China.
4. **K. Biswas** (2014) "Search for improved-performance scintillator candidates among the electronic structures of mixed halides", SPIE Optical Engineering + Applications Conference, San Diego, CA.
5. **K. Biswas** (2014) "Impurities in TlBr", TlBr Workshop & Review Meeting (Domestic Nuclear Detection Office), University of Michigan, Ann Arbor, MI.
6. **K. Biswas** (2014) "Scintillation Mechanisms in Gamma Detectors – Electronic Structure Theory", Department of Energy-National Nuclear Security Administration Workshop, Washington, DC.
7. **K. Biswas** (2013) "DFT Studies of Semiconductor and Scintillator Detection Materials", March Meeting of the American Physical Society, Baltimore, MD.
8. **K. Biswas** (2013) "Density functional models of semiconductors", TlBr Workshop & Review Meeting (Domestic Nuclear Detection Office), Harvard University, Cambridge, MA.
9. **K. Biswas** (2013) "DFT based study of materials for radiation detector application", 6th Domestic Nuclear Detection Office-NSF Annual Academic Research Initiative (ARI) Grantees Program Review Meeting, Leesburg, VA.
10. **K. Biswas** (2012) "Materials for application in photovoltaics and optoelectronics", Applied Materials Science Division, Saha Institute of Nuclear Physics, Calcutta, India.
11. **K. Biswas** (2012) "Materials for application in photovoltaics and optoelectronics", Graduate Seminar Series, Materials Science and Engineering Department, University of Tennessee-Knoxville, TN.

RECENT PRESENTATIONS & ABSTRACTS

1. Y. Sun, S-L. Li, **K. Biswas**, and L. Zhang (2019) "Computational Design of New Polymorphs of Two-dimensional Semiconductor InSe With Enhanced Interlayer Interaction", American Physical Society March Meeting, Boston, MA.
2. **K. Biswas** and B. Kang (2018) "A Brief Perspective on Perovskite-type Halides as Highly Luminescent Materials", IEEE Nuclear Science Symposium and Medical Imaging Conference, Sydney, Australia.
3. B. Kang and **K. Biswas** (2018) "Shallow vs. Deep Charge Localization in Hybrid Lead Halide Perovskites", American Physical Society March Meeting, Los Angeles, CA.
4. **K. Biswas**, Q. Feng, and B. Kang (2018) "Perovskite-type Metal Halides as Luminescent Materials", American Physical Society March Meeting, Los Angeles, CA.

5. **K. Biswas** (2018) "Physics-Driven Scintillator Design", Domestic Nuclear Detection Office Annual Review Conference, University of Tennessee, Knoxville, TN.
6. Q. Feng, B. Kang, J. Mize, and **K. Biswas** (2017) "First-principles Study of Complex Halide Scintillators for Radiation Detection", American Physical Society March Meeting, New Orleans, LA.
7. J. Mize, Q. Feng, B. Kang, **K. Biswas** (2017) "Investigating the Defect and Dopant Properties of $CsCaI_3:Eu^{2+}$ for Scintillator Applications: A First-principles Study", National Conference on Undergraduate Research, Memphis, TN.
8. J. Guilliams, B. Kang, and **K. Biswas** (2017) "Study of Cs_2XCl_6 (X = Hf, Ge, Pb, Sn, Zr) Compounds", Domestic Nuclear Detection Office Annual Review Conference, Wake Forest University, Winston-Salem, NC.
9. **K. Biswas** (2017) "Realizing High Performance Inorganic Scintillators at Low Cost", Domestic Nuclear Detection Office Annual Review Conference, Wake Forest University, Winston-Salem, NC.
10. **K. Biswas** (2016) "Emerging New Ternary Halides as Scintillators for Radiation Detection", IEEE Nuclear Science Symposium and Medical Imaging Conference, Strasbourg, France.
11. B. Kang and **K. Biswas** (2016) "Cesium Hafnium Chloride (CHC): Scintillator for Gamma Spectroscopy", IEEE Symposium on Radiation Measurements and Applications, University of California, Berkeley, CA.
12. **K. Biswas** and B. Kang (2016) "Ternary and Quaternary Monoclinic Iodides as Scintillators for Radiation Detection", IEEE Symposium on Radiation Measurements and Applications, University of California, Berkeley, CA.
13. C. Summers, M. Tuck, Q. Feng, B. Kang, and **K. Biswas** (2016) "Electronic Properties of Stable ABI_3 Compounds: First-Principles Study", Domestic Nuclear Detection Office Annual Review Conference, Georgia Institute of Technology, Atlanta, GA.
14. **K. Biswas**, B. Kang, Q. Feng, and *C. Summers* (2016) "Ternary Halides Emerging as Potential Scintillators", Domestic Nuclear Detection Office Annual Review Conference, Georgia Institute of Technology, Atlanta, GA.