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Condensed Matter Physics (Theory of Materials)

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Professional Experience

- Professor in Physics, Suranaree University of Technology, Thailand [2006-]
- Associate Professor in Physics, Suranaree University of Technology, Thailand [2003-2006]
- Lecturer in Physics, Suranaree University of Technology, Thailand [2001-2003]
- Visiting Professor, University of California, Santa Barbara, CA, USA [2006, 4 months]
- Research Associate, National Renewable Energy Laboratory, CO, USA [2003-2007, 14 months]
- Postdoctoral/Visiting Fellow, Xerox Palo Alto Research Center, CA, USA [2000-2002, 2.5 years]
- Postdoctoral Fellow, Case Western Reserve University, OH, USA [1999, 2 months]
- Research Assistant, Case Western Reserve University, OH, USA [1996-1999]
- Network support staff (part time), Case Western Reserve University, OH, USA [1998-1999]

Education

- Ph.D. 1999 (Physics), Case Western Reserve University, USA
  Advisor: Prof. Walter Lambrecht
  Dissertation topic: *Theoretical Study of some Aspects of Polytypism in SiC*
- M.S. 1996 (Physics), Case Western Reserve University, USA
  concentration in solid state physics and band structure of materials.
- B.S. 1993 (Physics, 1st Class Honor), Khonkaen University, Thailand
  concentration in electronics, computer programming, and solid state physics.

Recent Research Interests

My current research interests cover: (1) Semiconductor alloys and structural phase transformation of nanoscale semiconductors under high pressure. (2) Characterization of hydrogen in materials. (3) Electronic properties of impurities and defects in III-V and II-VI semiconductors. (4) Structural identification of defects in semiconductors by various techniques such as IR spectroscopy, electron paramagnetic resonance, and photoluminescence. (5) Applications of x-ray absorption spectroscopy in material characterizations.

Honors and Awards

- ***" TWAS Young Affiliate for 2007-2012 "***
  from the Third Word Academy of Science (TWAS) Regional Office for East and South-East Asia, Beijing, China
- ***" 2005 Thailand Young Scientist Award "***
  from the Foundation for the Promotion of Science and Technology under the Patronage of His Majesty the King
- ***" 2004 TWAS Prize for Young Scientists in Thailand "***
  from the Third Word Academy of Science (TWAS) and the National Research Council of Thailand (NRCT)
- ***" 2005 Corbett Prize for Young Scientists "***
  from the 23rd International Conf. of Defects in Semiconductors (ICDS-23)
- ***" 2006 SUT Outstanding Researcher Award "***
  from Suranaree University of Technology (SUT)
- ***" 2003 and 2005 TRF Advanced Research Scholar "***
  from the Thailand Research Fund (TRF)
- ***" 2003 NRCT National Best Thesis Award "*** in mathematics and physical science
  from the National Research Council of Thailand (NRCT)
- ***" 2005 NRCT Research Award "*** in mathematics and physical science
  from the National Research Council of Thailand (NRCT) for research on "*First-principles study of ZnO-based alloys*"
- Invited Speaker at international conferences, such as AOFSRR2007, ICMAT2007, GRC2006, AWFPESC2005, MRS2004, GRC2002, and CAARI2002.
- Serve as a regular referee for three prestigious journals: Physical Review Letters (Journal Impact Factor = 7.49), Applied Physics Letters (JIF = 4.13), and Physical Review B (JIF = 3.19)

Research Grant Awarded

- AOARD/AFOSR 2008: "*First-principles study of defects in GaN"* from US Air Force Office of Scientific Research (2008, starting)
- Basic Research Grant (ทุนวิจัยองค์ความรู้ใหม่ที่เป็นพื้นฐานต่อการพัฒนา: วุฒิเมธีวิจัย): (1) "*Formation and diffusion of defects in ZnO: theory and computations"* from the Thailand Research Fund (2003-2006, completed); (2) *"Properties of defects and dopants in wide gap semiconductors: theory and computations"* from the Thailand Research Fund (2005-2008, completing)
- Research-Development and Engineering Grants 2006: "*Nanoscale and atomic scale investigations of condensed matters: Theory and Computations"* from NANOTEC (Thailand) (2006-2007, completing)
- AOARD/AFOSR 2005: "*Computational Probe of Point Defects in Semiconductors by First-Principles Methods"* from US Air Force Office of Scientific Research (2005, completed)
- Research Grants 2005: "*Probing defects and surface reconstructions of semiconductors by synchrotron: A first principles study"* from the National Synchrotron Research Center (Thailand) (2005-2006, completed)
- Science and Technology Research Grants 2002: "*First-principles study of ZnO-based alloys"* from the Thailand Toray Science Foundation (2003, completed)
- The Royal Golden Jubilee Ph.D. Advisorships (Class V, VI, VII, VIII, IX, and X) from the Thailand Research Fund (2001 – present, 4 scholarships are occupied and in progress)

Publications (cited over 800 times and *h*-index = 19*, based on ISI database on Jan 2008)

Refereed Journals with journal impact factors (48)

(journals with JIF ≥ 3.0 are listed in **boldface**; representative publications are highlighted by "►")

1. ►A. Janotti, P. Reunchan, Sukit Limpijumnong, and C. G. Van de Walle, *Mutual Passivation of Electrically Active and Isovalent Impurities in Dilute Nitrides*, **Phys. Rev. Lett.** 100, 024104 (2008).
2. ►K. Sarasamak, A.J. Kulkarni, M. Zhou, and Sukit Limpijumnong, *Stability of wurtzite, unbuckled wurtzite, and rocksalt phases of SiC, GaN, InN, ZnO, and CdSe under loading of different triaxialities*, **Phys. Rev. B** 77, 024104 (2008).
3. A.J. Kulkarni, K. Sarasamak, J. Wang, F.J. Ke, Sukit Limpijumnong, and M. Zhou, *Effect of load triaxiality on polymorphic transitions in zinc oxide*, Mechanics Research Communications 35, 73 (2008).
4. J. Wang, A.J. Kulkarni, K. Sarasamak, Sukit Limpijumnong, F.J. Ke, and M. Zhou, *Molecular dynamics and density functional studies of a body-centered-tetragonal polymorph of ZnO*, **Phys. Rev. B** 76, 172103 (2007).
5. M.F. Smith, K. Setwong, R. Tongpool, D. Onkaw, S. Na-phattalung, Sukit Limpijumnong, and S. Rujirawat, *Identification of bulk and surface sulfur impurities in TiO_2 by synchrotron x-ray absorption near edge structure*, **Appl. Phys. Lett.** 91, 142107 (2007).
6. ►Sukit Limpijumnong, S. Rujirawat, A. Boonchun, M.F. Smith, and B. Cherdhirunkorn, *Identification of Mn site in $Pb(Zr,Ti)O_3$ by synchrotron x-ray absorption near-edge structure: Theory and Experiment*, **Appl. Phys. Lett.** 90, 103113 (2007).
7. A. Boonchun, M.F. Smith, B. Cherdhirunkorn, and Sukit Limpijumnong, *First principles study of Mn impurities in $PbTiO_3$ and $PbZrO_3$*, J. Appl. Phys. 101, 043521 (2007).
8. A.J. Kulkarni, K. Sarasamak, Sukit Limpijumnong, and M. Zhou, *Characterization of novel pseudoelastic behavior of zinc oxide nanowires*, Philosophical Magazine 87, 2117 (2007).
9. ►Sukit Limpijumnong, M.F. Smith, and S.B. Zhang, *Characterization of As-doped, p-type ZnO by x-ray absorption near-edge structure spectroscopy: Theory*, **Appl. Phys. Lett.** 89, 222113 (2006).
10. ►A.J. Kulkarni, M. Zhou, K. Sarasamak and Sukit Limpijumnong, *Novel phase transformation in ZnO nanowires under tensile loading*, **Phys. Rev. Lett.** 97, 105502 (2006).
11. ►M.-H. Du, Sukit Limpijumnong, and S.B. Zhang, *Hydrogen-mediated nitrogen clustering in dilute III-V nitrides*, **Phys. Rev. Lett.** 97, 075503 (2006).
12. Y.J. Zeng, Z.Z. Ye, J.G. Lu, W.Z. Xu, L.P. Zhu, B.H. Zhao, and Sukit Limpijumnong, *Photoluminescence study of Li-doped p-type ZnO thin films*, **Appl. Phys. Lett.** 89, 042106 (2006).
13. S. Na-Phattalung, M. F. Smith, K. Kim, M.-H. Du, S.-H. Wei, S.B. Zhang, and Sukit Limpijumnong, *First-principles study of native defects in anatase TiO_2*, **Phys. Rev. B** 73, 125205 (2006).
14. Sukit Limpijumnong, X. Li, S.-H. Wei, and S.B. Zhang, *Probing deactivations in Nitrogen doped ZnO by vibrational signatures: A first principles study*, Physica B 376–377, 686 (2006).
15. M.-H. Du, Sukit Limpijumnong, and S.B. Zhang, *Ion relaxation and hydrogen LVM in H-irradiated GaAsN*, Physica B 376–377, 583 (2006).
16. X. Li, S.E. Asher, Sukit Limpijumnong, S.B. Zhang, S.-H. Wei, T.M. Barnes, T.J. Coutts, and R.Noufi, *Unintentional doping and compensation effects of carbon in metal-organic chemical-vapor deposition fabricated ZnO thin films*, J. Vac. Sci. Technol. A 244, 1213 (2006).
17. X. Li, S.E. Asher, Sukit Limpijumnong, B.M. Keyes, C.L. Perkins, T.M. Barnes, H.R. Moutinho, J.M. Luther, S.B. Zhang, S.-H. Wei, and T.J. Coutts, *Impurity effects in ZnO and nitrogen-doped ZnO thin films fabricated by MOCVD*, J. Crys. Growth 287, 94 (2006).
18. ►D.C. Look, G.C. Farlow, P. Reunchan, Sukit Limpijumnong, S.B. Zhang, and K. Nordlund, *Evidence for native-defect donors in n-type ZnO*, **Phys. Rev. Lett.** 95, 225502 (2005).
19. M.-H. Du, Sukit Limpijumnong, and S.B. Zhang, *Hydrogen pairs and local vibrational frequencies in H-irradiated $GaAs_{1-y}N_y$*, **Phys. Rev. B** 72, 073202 (2005).
20. ►Sukit Limpijumnong, and S.B. Zhang, *Resolving hydrogen binding sites by pressure - A first-principles prediction for ZnO*, **Appl. Phys. Lett.** 86, 151 910 (2005).

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* There are 19 publications each of which has been cited 19 times or more.

21. ▶Sukit Limpijumnong, X. Li, S.-H. Wei, and S.B. Zhang, *Substitutional diatomic molecules NO, NC, CO, N_2 , and O_2: Their vibrational frequencies and effects on p doping of ZnO*, **Appl. Phys. Lett.** 86, 211 910 (2005).
22. X. Li, B. Keyes, S. Asher, S.B. Zhang, S.-H. Wei, T.J. Coutts, Sukit Limpijumnong, and C.G. Van de Walle, *Hydrogen Passivation Effect in Nitrogen-Doped ZnO Thin Films*, **Appl. Phys. Lett.** 86, 122107 (2005).
23. N.Q. Thinh, I.P. Vorona, I.A. Buyanova, W.M. Chen, Sukit Limpijumnong, S.B. Zhang, Y.G. Hong, C.W. Tu, A. Utsumi, Y. Furukawa, S. Moon, A. Wakahara, and H. Yonezu, *Properties of Ga-interstitial defects in $Al_xGa_{1-x}N_yP_{1-y}$*, **Phys. Rev. B** 71, 125209 (2005).
24. ▶Sukit Limpijumnong, S.B. Zhang, S.-H. Wei, and C.H. Park, *Doping by Large Size-Mismatched Impurities: The Microscopic Origin for Arsenic- or Antimony-Doped p-Type Zinc Oxide*, **Phys. Rev. Lett.** 92, 155504 (2004).
25. ▶Sukit Limpijumnong and Sirichok Jungthawan, *First-principles study of the wurtzite-to-rocksalt homogeneous transformation in ZnO: A case of a low-transformation barrier*, **Phys. Rev. B** 70, 054104 (2004).
26. ▶Sukit Limpijumnong and C.G. Van de Walle, *Diffusivity of native defects in GaN*, **Phys. Rev. B** 69, 035207 (2004).
27. N.Q. Thinh, I.P. Vorona, I.A. Buyanova, W.M. Chen, Sukit Limpijumnong, S.B. Zhang, Y.G. Hong, C.W. Tu, A. Utsumi, Y. Furukawa, S. Moon, A. Wakahara, and H. Yonezu, *Identification of Ga-interstitial defects in GaN_yP_{1-y} and*
$Al_xGa_{1-x}N_yP_{1-y}$, **Phys. Rev. B (Rapid Communications)** 70, R121201 (2004).
28. Sukit Limpijumnong and C.G. Van de Walle, *Stability, diffusivity, and vibrational properties of monatomic and molecular hydrogen in wurtzite GaN*, **Phys. Rev. B** 68, 235 203 (2003).
29. Sukit Limpijumnong, J.E. Northrup, and C.G. Van de Walle, *Identification of hydrogen configurations in p-type GaN through first-principles calculations of vibrational frequencies*, **Phys. Rev. B** 68, 075 206 (2003).
30. Sukit Limpijumnong and W.R.L. Lambrecht, *Band structure of $CdGeAs_2$ near the fundamental gap*, **Phys. Rev. B** 65, 165204 (2002).
31. W.R.L. Lambrecht, A.V. Rodina, Sukit Limpijumnong, B. Segall and B.K. Meyer, *Valence band ordering and magneto-optic exciton fine structure in ZnO*, **Phys. Rev. B** 65, 075 207(2002).
32. ▶Sukit Limpijumnong, J.E. Northrup, and C.G. Van de Walle, *Entropy-driven stabilization of a novel configuration for acceptor-hydrogen complexes in GaN*, **Phys. Rev. Lett**. 87, 205 505 (2001).
33. Sukit Limpijumnong and C.G. Van de Walle, *Passivation and Doping due to Hydrogen in III-Nitrides*, Phys. Stat. Sol. b 228, 303 (2001).
34. M. Miao, Sukit Limpijumnong, and W.R.L. Lambrecht, *Stacking fault band structure in 4H SiC and its impact on electronic devices*, **Appl. Phys. Lett.** 79, 4360 (2001).
35. ▶Sukit Limpijumnong and W.R.L. Lambrecht, *Homogeneous strain deformation path for the wurtzite to rocksalt high-pressure phase transition in GaN*, **Phys. Rev. Lett.** 86, 91 (2001).
36. Sukit Limpijumnong and Walter R. L. Lambrecht, *Theoretical study of the relative stability of wurtzite and rocksalt phases in MgO and GaN*, **Phys. Rev. B** 63, 104 103 (2001).
37. C.G. Van de Walle, Sukit Limpijumnong, and J. Neugebauer, *First-principles studies of beryllium doping of GaN*, **Phys. Rev. B** 63, 245 205 (2001).
38. J.S. Dyck, K. Kim, Sukit Limpijumnong, W.R.L. Lambrecht, K. Kash, J.C. Angus, *Identification of Raman-active phonon modes in oriented platelets of InN and polycrystalline InN*, Solid State Commun 114, 355 (2000).
39. Sukit Limpijumnong, W.R.L. Lambrecht, S.N. Rashkeev, and B. Segall, *Theory of the optical absorption bands in the 1-3 eV range in n-type Silicon Carbide polytypes*, **Phys. Rev. B** 59, 12 890 (1999).
40. Sukit Limpijumnong and W.R.L. Lambrecht, *Electronic structure of $ZnGeP_2$: a detailed study of the band structure near the fundamental gap and its associated parameters*, **Phys. Rev. B** 60, 8087 (1999).
41. S.N. Rashkeev, Sukit Limpijumnong, and W.R. L. Lambrecht, *Second-harmonic generation and birefringence of some ternary pnictide semiconductors*, **Phys. Rev. B** 59, 2737 (1999).
42. S.N. Rashkeev, Sukit Limpijumnong, and W.R.L. Lambrecht, *Theoretical evaluation of $LiGaO_2$ for frequency up conversion to ultraviolet*, J. Opt. Soc. Am. B 16, 2217 (1999).
43. Sukit Limpijumnong, S.N. Rahkeev and W.R.L. Lambrecht, *Electronic structure and optical properties of $ZnGeN_2$*, **MRS Internet J. Nitride Semicond. Res.** 4S1, G6.11 (1999).
44. W.R.L. Lambrecht, Sukit Limpijumnong, and B. Segall, *Theoretical study of ZnO and related $Mg_xZn_{1-x}O$ alloy band structures*, **MRS Internet J. Nitride Semicond. Res.** 4S1, G6.8 (1999).
45. J.D. Albrecht, P.P. Ruden, Sukit Limpijumnong, W.R.L. Lambrecht, and K.F. Brennan, *High field electron*

transport properties of bulk ZnO, J. Appl. Phys. 86, 6864 (1999).

46. Sukit Limpijumnong and W.R.L. Lambrecht, *Total energy differences between SiC polytypes revisited*, **Phys. Rev. B** 57, 12 017 (1998).
47. H.-J. Im, B. Kaczer, J.P. Pelz, Sukit Limpijumnong, W.R.L. Lambrecht, and W.J. Choyke, *Nanometer-scale investigation of metal-SiC interfaces using ballistic electron emission microscopy*, Journal of Electronic Materials 27, 345 (1998).
48. W.R.L. Lambrecht, Sukit Limpijumnong, S.N. Rashkeev, and B. Segall, *Electronic band structure of SiC polytypes: a discussion of theory and experiment,* Phys. Stat. Solidi (b) 202, 5 (1997).

Teaching Responsibilities

- Thesis: currently supervising five Ph.D. students (four RGJ scholars) and a M.Sc. student.
- Graduate courses:

105751	Condensed Matter Physics I
105752	Condensed Matter Physics II
105758	Computational Methods for Real Materials
105781	Computational Physics
105621	Quantum Theory I
105743	Instrumentation Techniques for Physics Research
105x96	Seminar I-IV

- Undergraduate courses:

105101	Physics I
105102	Physics II
105191	Physics Lab. I
105192	Physics Lab. II

References

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