

# ALEX PUNNOOSE

## LIST OF REFEREED PUBLICATIONS AND PATENTS

(\*\* indicates undergraduate students, \* indicates graduate students)

### 2015

1. Developing an orthotopic larval zebrafish xenograft assay to prioritize novel human glioblastoma therapeutics, Leah C. Wehmas\*, Alex Punnoose, Cliff Pereira, Robert L. Tanguay, Juliet A. Greenwood, Zebrafish (submitted 2015).
2. Comparative Metal Oxide Nanoparticle Toxicity Using Embryonic Zebrafish, Leah C. Wehmas\*, Cliff B. Pereira, Juliet A. Greenwood, Catherine Anders\*, Jordan Chess\*\*, Alex Punnoose and Robert L. Tanguay, Toxicology Reports **2**, 702-715 (2015).
3. Sol-gel synthesis and characterization of  $x\text{CuO}-(1-x)\text{Bi}_2\text{O}_3$  ( $0.15 \leq x \leq 0.55$ ) glasses by magnetic and spectral studies; B.B. Das, A. Srinivassan, M. Yogapriya, M.R. Kongara, A. Punnoose; *Journal of Non-Crystalline Solids* **427** (2015) 146–151
4. An X-band  $\text{Co}^{2+}$  EPR study of  $\text{Zn}_{1-x}\text{Co}_x\text{O}$  ( $x=0.005-0.1$ ) nanoparticles prepared by chemical hydrolysis methods using diethylene glycol and denaturated alcohol at 5 K, Sushil K. Misra, S.I. Andronenko, S. Srinivasa Rao, Jordan Chess, A. Punnoose, Journal of Magnetism and Magnetic Materials **394** (2015) 138–142
5. Synthesis and characterization of  $\text{Zn}(\text{acetate})_2(\text{amine})_x$  compounds and their use as precursors to ZnO Jesse S. Hyslop\*\*, Amanda R. Snyder\*\*, Theron R. Fereday\*\*, Joanna R. Walker\*\*, Jennifer L. Young\*\*, Christian T. Wall, Jerry D. Harris, Aaron Thurber, Alex Punnoose, Jason Brotherton\*, Pamela Walker\*, William B. Knowlton, Seth M. Hubbard, and Brian J. Frost, *Materials Processing in Semiconductor Technology*, **38**, 278-289 (2015).
6. Synthesis of ZnO Nanoparticles with Controlled Shapes, Sizes, Aggregations, and Surface Complex Compounds for Tuning or Switching the Photoluminescence; Jianhui Zhang, Baodan Zhao, Zhongda Pan\*, Min Gu, and Alex Punnoose; *Cryst. Growth Des.*, **15**, pp 3144–3149 (2015)

7. Understanding the Role of Iron in the Magnetism of Fe-Doped ZnO Nanoparticles" J. Beltran\*, C. A. Barrero and A. Punnoose, *Physical Chemistry Chemical Physics*; **17**, 15284 (2015).
8. Novel Magnetic and Optical Properties of Sn<sub>1-x</sub>Zn<sub>x</sub>O<sub>2</sub> Nanoparticles, Nevil Arley Franco\*\*, K. M. Reddy , Josh Eixenberger\*\* , D. A. Tenne , Charles Hanna , Alex Punnoose; *Journal of Applied Physics*, in press (2015).

## 2014

9. Magnetoresistance characteristics in individual Fe<sub>3</sub>O<sub>4</sub> single crystal nanowire, K. M. Reddy, Nitin Padture , Alex Punnoose , Charles Hanna, *Journal of Applied Physics*, in press (2014).
10. Heterojunction metal-oxide-metal Au-Fe<sub>3</sub>O<sub>4</sub>-Au single nanowire device for spintronics, K. M. Reddy (corr-auth) , Nitin Padture , Alex Punnoose , Charles Hanna, *Journal of Applied Physics*, in press (2014).
11. "Evidence of Ferromagnetic Signal Enhancement in Fe and Co Co-Doped ZnO Nanoparticles by Increasing Superficial Co<sup>3+</sup> Content" Beltran Jimenez, Jailes\*; Barrero, C.A.; Punnoose, Alex, *Journal of Physical Chemistry C*, **2014**, *118* (24), pp 13203–13217.
12. Cytotoxicity of ZnO nanoparticles can be tailored by modifying their surface structure: A green chemistry approach for safer nanomaterials" Punnoose, Alex; Dodge, Kelsey\*\*; Rasmussen, John; Chess, Jordan\*\*; Wingett, Denise; Anders, Catherine\*, *ACS Sustainable Chem. Eng.*, 2014, *2* (7), pp 1666–1673.
13. Tuning the Bandgap and Cytotoxicity of ZnO by Tailoring the Nanostructures; Jianhui Zhang, GuanJun Dong\*, Aaron Thurber, Yayi Hou, Dmitri A. Tenne, Charles B. Hanna, Min Gu, Zhongda Pan, Kaiyu Wang, Youwei Du, and Alex Punnoose, *Particle and Particle System Characterization*, Volume 32, Issue 5, pages 596–603, May 2015.
14. Defect induced ferromagnetism in undoped ZnO nanoparticles, Katie Rainey\*\*, Jordan Chess\*\*, Josh Eixenberger\*\*, D. Tenne, and Charles Hanna, Alex Punnoose, *Journal of Applied Physics* *115*, 17D727 (2014)
15. Sushil K. Misra, S. I. Andronenko, A. Thurber\*, A. Punnoose, A. Nalepa, An X- and Q-band Fe<sup>3+</sup> EPR Study of Nanoparticles of Magnetic Semiconductor Zn<sub>1-x</sub>Fe<sub>x</sub>O, *Journal of Magnetism and Magnetic Materials*, *363*, 82–87(2014).
16. Dopant spin states and magnetism of Sn<sub>1-x</sub>Fe<sub>x</sub>O<sub>2</sub> nanoparticles. Alex Punnoose, Kelsey Dodge\*\*, Jailes Beltrán\*, Nevil Franco\*\*, M. R. Kongara, Jordan Chess\*\*, Josh Eixenberger\*\*, and C. A. Barrero, *Journal of Applied Physics* *115*, 17B534 (2014)

## 2013

17. Ferromagnetism in Annealed  $\text{Ce}_{0.95}\text{Co}_{0.05}\text{O}_2$  and  $\text{Ce}_{0.95}\text{Ni}_{0.05}\text{O}_2$  Nanoparticles, S. K. Misra, S. I. Andronenko, J. D. Harris, A. Thurber, G. L. Beausoleil II\*\* and A. Punnoose, *Journal of Nanoscience and Nanotechnology*, 13, 6798-805, 2013.
18. Correlation between magnetism and electronic structure of  $\text{Zn}_{1-x}\text{Co}_x\text{O}$  nanoparticles, Jordan Chess\*\*, Gordon Alanko\*\*, Dmitri A. Tenne, Charles B. Hanna, and Alex Punnoose, *Journal of Applied Physics* **113**, 17C302 (2013).
19. Thermal Expansion of Alkaline-Doped Lanthanum Ferrite Near the Néel Temperature, L. Beausoleil II\*, Patrick Price\*, David Thomsen\*\*, Alex Punnoose, Rick Ubic, Scott Misture, and Darryl P. Butt, *Journal of the American Ceramic Society*, Volume 97, 228–234, (2014).
20. Fluctuant magnetism of  $\text{ZnO}$ ,  $\text{TiO}_2$ ,  $\text{SnO}_2$ , and  $\text{CeO}_2$  nanospheres by modifying the capping surfactant, Jianhui Zhang\*, Aaron Thurber, Michael Jones\*\*, Min Gu, Xinglong Wu, Dmitri A. Tenne, C. B. Hanna, and Alex Punnoose, *Physical Review B* **88**, 085437 (2013).
21. Role of oxygen defects on the magnetic properties of ultra-small  $\text{Sn}_{1-x}\text{Fe}_x\text{O}_2$  nanoparticles, Kelsey Dodge\*\*, Jordan Chess\*\*, Josh Eixenberger\*\*, Gordon Alanko\*\*, Charles B. Hanna, and Alex Punnoose, *Journal of Applied Physics* **113**, 17B504 (2013).
22. Magnetic Properties of Fe doped, Co doped and Fe+Co co-doped  $\text{ZnO}$ ; J.J. Beltrán\*, J. A. Osorio, C. A. Barrero, C. B. Hanna and A. Punnoose, *Journal of Applied Physics* **113**, 17C308 (2013).

## 2012

23. Size, Surface Structure and Doping Effects on Ferromagnetism in  $\text{SnO}_2$ . Gordon Alanko\*\*, Aaron Thurber, Charles Hanna and Alex Punnoose. *Journal of Applied Physics*, *J. Appl. Phys.* **111**, 07C321 (2012).
24. Concentration dependence of magnetic moment in  $\text{Ce}_{1-x}\text{Fe}_x\text{O}_2$ , G. L. Beausoleil\*\*, G. Alanko\*\*, Charles Hanna, S. Srinivasa Rao and Alex Punnoose, *Journal of Applied Physics*, **111**, 07B546 (2012).
25. Unusual crystallite expansion and modification of ferromagnetism due to aging in pure and doped  $\text{ZnO}$  nanoparticles. Aaron P. Thurber, Kelsey N. Dodge\*\*, Gordon Alanko\*\*, Geoffrey L. Beausoleil II\*\*, Charles Hanna and Alex Punnoose. *Journal of Applied Physics*, **111**, 07C319 (2012).

26. Improving the selective cancer killing ability of ZnO nanoparticles using Fe doping, Aaron Thurber, Denise G. Wingett, John W. Rasmussen, Janet Layne\*, Lydia Johnson\*, Dmitri A. Tenne, Jianhui Zhang, Charles B. Hanna, and Alex Punnoose, *Nanotoxicology*, June 2012, Vol. 6, No. 4 : Pages 440-452.
27. Tuning the properties of ZnO, hematite, and Ag nanoparticles by adjusting the surface charge, Jianhui Zhang, Guanjun Dong, Aaron Thurber, Yayi Hou\*, Min Gu, Dmitri A. Tenne, C. B. Hanna, and Alex Punnoose, *Advanced Materials* 24:1232-7 (2012).

## 2011

28. Synthesis and Characterization of chromium-isothiocyanate-4-methylpyridine complexes, J. L. Young\*\*, J. D. Harris, J. A. Benjamin\*\*, J. E. Fitch\*\*, D. F. Nogales\*\*, J. R. Walker, B. J. Frost\*\*, A. Thurber and A. Punnoose, *Inorganica Chimica Acta*, 377, 14-19 (2011).
29. A Large Scale Synthesis and Characterization of Quaternary  $\text{CuIn}_x\text{Ga}_{1-x}\text{S}_2$  Chalcopyrite Nanoparticles via Microwave Batch Reactions," by Chivin Sun, Richard Westover, Gary Long, Cyril Bajracharya\*, Jerry Harris, Alex Punnoose, Rene G. Rodriguez and Joshua J. Pak, *International Journal of Chemical Engineering*, Volume 2011, Article ID 545234, 8 pages (2011).
30. Magnetism of ZnO Nanoparticles: Dependence on crystallite size and surfactant coating ,Aaron P. Thurber, Geoffrey L. Beausoleil II\*\*, Gordon A. Alanko\*\*, Joshua J. Anghel\*\*, Michael S. Jones\*\*, Lydia M. Johnson\*, Jianhui Zhang, C. B. Hanna, D. A. Tenne, and Alex Punnoose, *Journal of Applied Physics*, 109, 07C305 (2011).

## 2010

31. Enhanced Dye Fluorescence in novel Dye-ZnO nano-composites. Jianhui Zhang, Aaron Thurber, Dmitri Tenne, Denise Wingett, Charles Hanna, and Alex Punnoose, *Advanced Functional Materials* 20, 4358 (2010).
32. A High Yield Synthesis of Chalcopyrite  $\text{CuInS}_2$  Nanoparticles with Exceptional Size Control, Chivin Sun, Joseph S. Gardner\*\*, Endrit Shurdha\*, Kelsey R. Margulieux\*\*, Richard D. Westover\*, Lisa Lau\*, Gary Long\*\*, Cyril Bajracharya\*, C. M. Wang, Aaron Thurber, A. Punnoose, Rene G. Rodriguez and Joshua J. Pak, *Journal of Nanomaterials* vol. 2009, Article ID 748567, 7 pages, (2010).
33. Controlled Stoichiometry for Quaternary  $\text{CuIn}_x\text{Ga}_{1-x}\text{S}_2$  Chalcopyrite Nanoparticles from Single Source Precursors via Microwave Irradiation, Chivin Sun, Joseph Gardner, Gary Long, Cyril Bajracharya\*\*, Aaron Thurber, Alex Punnoose, Rene Rodriguez, Joshua Pak, *Chemistry of Materials*, 22, 2699 (2010).

34. Transition metal dopants essential for producing ferromagnetism in metal oxide nanoparticles, Lydia Johnson, Aaron Thurber, Josh Anghel\*\*, Maryam Sabetian\*\*, Mark H. Engelhard, D. Tenne, Charles Hanna and Alex Punnoose, *Physical Review B* 82, 054419 (2010).
35. Highly shape-selective synthesis, silica coating, self-assembly, and magnetic hydrogen sensing of hematite nanoparticles, Jianhui Zhang, Aaron Thurber, Charles Hanna and Alex Punnoose, *Langmuir* 26, 5273 (2010).
36. Correlation between saturation magnetization, bandgap and lattice volume of transition metal (M = Cr, Mn, Fe, Co or Ni) doped Zn<sub>1-x</sub>M<sub>x</sub>O nanoparticles; J. Anghel\*\*, A. Thurber, D. Tenne, C. B. Hanna, A. Punnoose, *Journal of Applied Physics* 107, 09E314 (2010).
37. Electrostatic interactions affect nanoparticle-mediated toxicity to the Gram-negative bacterium *Pseudomonas aeruginosa* PAO1. Kevin Feris, Caitlin Otto\*\*, Juliette Tinker, Denise Wingett, Alex Punnoose, Aaron Thurber, Madhu Kongara, Maryam Sabetian\*\*, Bonnie Quinn, Charles Hanna, David Pink, *Langmuir*, **2010**, 26 (6), pp 4429–4436.

## 2009

38. A 236-GHz Fe<sup>3+</sup> EPR study of nano-particles of the ferro-magnetic room-temperature semiconductor Sn<sub>1-x</sub>Fe<sub>x</sub>O<sub>2</sub> (x=0.005), Sushil K. Misra, S. I. Andronenko, A. Punnoose, Dmitry Tipikin\* and J. H. Freed, *Applied Magnetic Resonance*, Volume 36, Issue 2, Page 291. (2009).
39. The influences of cell type and ZnO nanoparticle size on immune cell cytotoxicity and cytokine induction. C. Hanley\*, A. Thurber, C. Hanna, A. Punnoose, J. Zhang and D. Wingett, *Nanoscale Research Letters*, Vol. 4, 1409-1420 (2009).
40. Formation of an unusual copper(II) complex from the degradation of a novel tricopper(II) carbohydrazone complex. E. Manoj\*, M. R. Prathapachandra Kurup, R. P. John, M. Nethaji and A. Punnoose, *Inorganic Chemistry Communications* 12, 952 (2009).
41. Influence of oxygen level on structure and ferromagnetism in Sn<sub>0.95</sub>Fe<sub>0.05</sub>O<sub>2</sub> nanoparticles. A. Thurber\*, K. M. Reddy and A. Punnoose, *Journal of Applied Physics*, 105, 07E706 (2009).
42. Dopant Spin States and Magnetic Interactions in Transition Metal Doped Semiconductor Nanoparticles. A. Punnoose, K. M. Reddy, J. Hays\*\*, A. Thurber\*, S. Andronenko and S. K. Misra, *Applied Magnetic Resonance*, Vol. 36, pages 331-345 (2009).

43. Cr<sup>3+</sup> electron paramagnetic resonance study of Sn<sub>1-x</sub>Cr<sub>x</sub>O<sub>2</sub> (0.00 ≤ x ≤ 0.01). S. K. Misra, S. I. Andronenko, S. Rao\*, S. V. Bhat, C. Van Komen\*\* and A. Punnoose, *Journal of Applied Physics*, 105, 07C514 (2009).
44. Preparation, magnetic and EPR spectral studies of copper(II) complexes of an anticancer drug analogue, E. Manoj\*, M.R. Prathapachandra Kurup, and Alex Punnoose, *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 72, 474-483, (2009).
45. Fluorescent dye encapsulated ZnO particles with cell-specific toxicity for potential use in biomedical applications. H. Wang, D. Wingett, M. H. Engelhard, K. Feris, K. M. Reddy, P. Turner\*\*, J. Layne\*, C. Hanley\*, J. Bell\*\*, D. Tenne, C. Wang and A. Punnoose, *J. Materials Science: Materials in Medicine*, 20, 11-22 (2009).
46. Ferromagnetic resonance properties and anisotropy of Ni-Mn-Ga thin films of different thicknesses deposited on Si substrate; Vladimir Golub, K. M. Reddy, Volodymyr Chernenko, Peter Mullner, Alex Punnoose, and Makoto Ohtsuka, *Journal of Applied Physics*, 105, 07A942 (2009).
47. Transition from n-type to p-type destroys ferromagnetism in semi-conducting Sn<sub>1-x</sub>Co<sub>x</sub>O<sub>2</sub> and Sn<sub>1-x</sub>Cr<sub>x</sub>O<sub>2</sub> nanoparticles. C. Van Komen\*\*, A. Punnoose and M. S. Seehra. *Solid State Communications* 149, 2257 (2009).

## 2008

48. Preferential killing of cancer cells and activated human T cells using ZnO nanoparticles. C. Hanley\*, J. Layne\*, A. Punnoose, K. M. Reddy, I. Coombs\*\*, A. Coombs\*\*, K. Feris and D. Wingett. *Nanotechnology* 19, 295103 (2008).
49. Role of dopant incorporation on the magnetic properties of Ce<sub>1-x</sub>Ni<sub>x</sub>O<sub>2</sub> nanoparticles: An electron paramagnetic resonance study. S. K. Misra, S. I. Andronenko, M. H. Engelhard, A. Thurber\*\*, K. M. Reddy and A. Punnoose. *J. Appl. Phys.* 103, 07D122 (2008).
50. Structure-magnetic property relationship in transition metal (M = V, Cr, Mn, Fe, Co, Ni) doped SnO<sub>2</sub> nanoparticles. C. Van Komen\*\*, A. Thurber, K. M. Reddy, J. Hays\* and A. Punnoose. *J. Appl. Phys.* 103, 07D141 (2008).

## 2007

51. "Selective toxicity of zinc oxide nanoparticles to prokaryotic and eukaryotic systems" K. M. Reddy, K. Feris, Jason Bell\*\*, Denise G. Wingett, Cory Hanley\*, and Alex Punnoose, *Applied Physics Letters*, 90, 213902 (2007).

52. “Novel magnetic hydrogen sensing: A case study using antiferromagnetic hematite nanoparticles” A. Punnoose, K. M. Reddy, M. H. Engelhard, J. Hays\* and A. Thurber\*\*, *Nanotechnology*, 18, 165502 (2007).
53. “Ferromagnetism in chemically synthesized CeO<sub>2</sub> nanoparticles by Ni doping” A. Thurber\*\*, K. M. Reddy, V. Shutthanandan, M. H. Engelhard, C. Wang, J. Hays\* and A. Punnoose, *Physical Review B* **76**, 165206 (2007).
54. “Self-assembled macrocyclic molecular squares of Ni (II) derived from carbohydrazones and thiocarbohydrazones: Structural and magnetic studies”, E. Manoj\*\*, M. R. Prathapachandra Kurup, H. –K. Fun and A. Punnoose, *Polyhedron* **26**, 4451 (2007).
55. “Effect of Co Doping on the Structural, Optical and Magnetic Properties of ZnO” J. Hays\*\*, K. M. Reddy, N. Graces, M. H. Engelhard, V. Shutthanandan, N. Giles, C. Wang, S. Thevuthasan and A. Punnoose, *J. Phys: Condens. Matter*, 19, 266203 (2007).
56. “On the Room Temperature Ferromagnetism of Zn<sub>1-x</sub>Cr<sub>x</sub>O Thin films Deposited by Reactive Co-sputtering”, K. M. Reddy, R. Benson\*, R. Hansen\*, J. Hays\*, A. Thurber\*\*, M. H. Engelhard, V. Shutthanandan, S. Thevuthasan, W. B. Knowlton and A. Punnoose, *Solar Energy Materials and Solar Cells*, 91, 1496 (2007).
57. “Magnetic properties of Chemically Synthesized Transparent Mn Doped ITO films”, K. M. Reddy, J. Hays\*, S. Kundu, L. K. Dua, P. K. Biswas, C. Wang, V. Shutthanandan, M. H. Engelhard and A. Punnoose, *Journal of Materials Science: Materials in Electronics*, 18, 1197 (2007).
58. “On the Occurrence and Stability of Ferromagnetism in Chemically Synthesized Cobalt doped TiO<sub>2</sub>”, K. M. Reddy and A. Punnoose, *Journal of Materials Science: Materials in Electronics*, 18, 1137 (2007).
59. “Effect of Fluorine Doping on the Ferromagnetic Properties of Sn<sub>0.95</sub>Fe<sub>0.05</sub>O<sub>2</sub>”, A. Thurber\*\*, J. Hays\*, K. M. Reddy, and A. Punnoose, *Journal of Materials Science: Materials in Electronics*, 18, 1151 (2007).
60. “Mapping ferromagnetism in Ti<sub>1-x</sub>Co<sub>x</sub>O<sub>2</sub> – Role of preparation temperature (200 – 900°C) and doping concentration (0.00015 < x < 0.1)”; K. M. Reddy and A. Punnoose, *Journal of Applied Physics*, **101** 09H112 (2007).
61. “High-temperature field-induced activation of ferromagnetism in Ce<sub>1-x</sub>Ni<sub>x</sub>O<sub>2</sub>”; Aaron Thurber\*\*, K. M. Reddy and Alex Punnoose; *Journal of Applied Physics* **101** 09N506 (2007).
62. “An Fe<sup>3+</sup> Electron Paramagnetic Resonance Study of Sn<sub>1-x</sub>Fe<sub>x</sub>O<sub>2</sub>”; Sushil K Misra, S. I. Andronenko, K. M. Reddy, J. Hays\*, A. Thurber\*\*, A. Punnoose, *Journal of Applied Physics*, 101, 09H120 (2007).

63. “Magnetism in transition metal doped tin dioxide” (Invited Article), J. Hays\*, K. M. Reddy, A. Thurber\*\*, A. Punnoose, book chapter in "Magnetism in semiconducting oxides", *Research Signpost*, Edited by Nguyen Hoa Hong, pages 87-115 (2007).

## 2006

64. “Structural modifications of SnO<sub>2</sub> due to the incorporation of Fe into the lattice” Xavier Mathew, C. Mejía-García\*, , J. P. Enriquez, G. Contreras-Puente, J. Hays\*\* and A. Punnoose, *Journal of Applied Physics*, **100**, 073907 (2006).
65. “Magnetic gas sensing using a dilute magnetic semiconductor” A. Punnoose, K. M. Reddy, M. H. Engelhard, J. Hays\*\* and A. Thurber\*\*, *Applied Physics Letters*, **89**, 112509 (2006).
66. “Quantification of Dopant Concentrations in Diluted Magnetic Semiconductors using Proton Induced X-ray Emission” V. Shutthanandan, S. Thevuthasan, T. Droubay, T. C. Kaspar, A. Punnoose, J. Hays\*\*, and S.A. Chambers, *Nuclear Instruments and Methods B* **249**, 402 (2006).
67. “Dopant Distribution, Oxygen Stoichiometry and Magnetism of Nanoscale Sn<sub>0.99</sub>Co<sub>0.01</sub>O<sub>2</sub>”, A. Punnoose, M. H. Engelhard and J. Hays\*\*, *Solid State Communications*, **139**, 434-438 (2006).
68. “Carrier controlled ferromagnetism in transparent oxide semiconductors” J. Philip, A. Punnoose, B. I. Kim, K. M. Reddy, S. Layne, J. O. Holmes\*\*, B. Satpati, P. R. LeClair, T. S. Santos and J. S. Moodera, *Nature Materials*, **5**, 298 (2006).
69. “Development and Processing Temperature Dependence of Ferromagnetism in Zn<sub>0.98</sub>Co<sub>0.02</sub>O”, J. Hays\*\*, A. Thurber\*\*, M. H. Engelhard, K. M. Reddy and A. Punnoose, for *Journal of Applied Physics*, **99**, 08M123 (2006).
70. “Magnetic Resonance studies of Co<sup>2+</sup> Ions in Nanoparticles of SnO<sub>2</sub> Processed at Different Temperatures”, S. K. Misra, Serguei I. Andronenko, K. M. Reddy, J. Hays\*\*, and A. Punnoose, *Journal of Applied Physics*, **99**, 08M106(2006).
71. “Effect of Interparticle Interaction on the Magnetic Relaxation of NiO Nanorods” H. Shim\*, A. Manivannan and M. S. Seehra, K. M. Reddy and A. Punnoose, *Journal of Applied Physics*, **99**, 08Q503 (2006).
72. “The effect of preparation conditions on the Fe incorporation and ferromagnetism of Sn<sub>1-x</sub>Fe<sub>x</sub>O<sub>2</sub>: A Raman spectroscopic investigation”, Xavier Mathew, C. Mejía-García\*, G. Contreras-Puente, J. Hays\*\*, and A. Punnoose, *Journal of Applied Physics*, **99**, 08M101 (2006).

## 2005



73. "Development of High Temperature Ferromagnetism in SnO<sub>2</sub> and Paramagnetism in SnO by Fe Doping", A. Punnoose, J. Hays\*\*, A. Thurber\*\*, M. H. Engelhard, R. K. Kukkadapu, C. Wang, V. Shutthanandan and S. Thevuthasan, *Physical Review B* 72, 054402 (2005).
74. "Relationship between the structural and magnetic properties of Co doped SnO<sub>2</sub> nanoparticles", J. Hays\*\*, A. Punnoose, R. Baldner, M. H. Engelhard, J. Peloquin and K. M. Reddy, *Physical Review B*, 72, 075203 (2005).
75. "High-frequency electron magnetic resonance and magnetic studies of ferrihydrite nanoparticles and evidence of a phase transition", A. Punnoose, M. S. Seehra, J. van Tol and L. C. Brunel, *Journal of Magnetism and Magnetic Materials*, 288, 168 (2005).
76. "Possible Metamagnetic Origin of Ferromagnetism in Transition-Metal-Doped SnO<sub>2</sub>" A. Punnoose and J. Hays\*\*, *Journal of Applied Physics* 97, 10D321 (2005).

#### 2004

77. "Room Temperature Ferromagnetism in Chemically Synthesized Sn<sub>1-x</sub>Co<sub>x</sub>O<sub>2</sub> Powders", A. Punnoose, J. Hays\*\*, V. Shutthanandan and V. Gopal, *Applied Physics Letters*, 85, 1559 (2004).
78. "Magnetic properties of ferrihydrite nanoparticles doped with Ni, Mo and Ir." A. Punnoose, M. Seehra, N. Shah, T. Phanthavady\*\* and G. P. Huffman, *Physical Review B*, 69, 054425 (2004).
79. "Catalysis for Synthesis Gas Formation from Reforming of Methane" M. V. Iyer\*\*, L. P. Norcio\*, A. Punnoose, E. L. Kugler, M. S. Seehra and D. B. Dadyburjor, *Topics in Catalysis*, 29, 197 (2004).
80. "Size dependence of the exchange bias and coercivity in CuO nanocrystals." M. S. Seehra and A. Punnoose, *Solid State Communications*, 128, 299 (2004).

#### 2003

81. "On the origin of room temperature ferromagnetism in Co-doped TiO<sub>2</sub> films" A. Punnoose, M. S. Seehra, W. K. Park and J. S. Moodera; *Journal of Applied Physics*, 93, 7867, (2003).
82. "Room Temperature Ferromagnetism in Transition Metal Doped Semiconductors (Invited)" A. Punnoose, *Proceedings of the Tenth International Conference on Composites/Nano Engineering*, July 20-24, 2003, New Orleans, LA.

83. "X-ray diffraction and electron magnetic resonance studies of M/Fe/Al<sub>2</sub>O<sub>3</sub> (M = Ni, Mo and Pd) catalysts for CH<sub>4</sub> to H<sub>2</sub> conversion." A. Punnoose, N. Shah, G. P. Huffman and M. S. Seehra, *Fuel Processing Technology*, Vol. 83, 263-273, **2003**.
84. "Conversion of Methanol to Olefins over Cobalt, Manganese and Nickel Incorporated SAPO-34 Molecular sieves." Delphine R. Dubois\*, Daniel Obrzut, Jing Liu, Jyothi Thundimadathil, Prakash M. Adekkanattu and James A. Guin, A. Punnoose and M. S. Seehra, *Fuel Processing Technology*, Vol. 83, 203-218, **2003**.
85. "Hysteretic Ferromagnetic Resonance as a probe for coercivity, Exchange Bias and Loop Asymmetry." A. Punnoose, E. H. Morales\*, Y. Wang, D. Lederman and M. S. Seehra; *Journal of Applied Physics*, 93, 771 (**2003**).
86. "High Frequency/High Field Electron Magnetic Resonance Studies of Ferrihydrite Nanoparticles" A. Punnoose, J. Van Tol, L. -C. Brunel and M. S. Seehra, National High Magnetic Field Laboratory **2003** Annual Research Review, Page. 25

## 2002

87. "Semiconducting and ferromagnetic behavior of sputtered Co-doped TiO<sub>2</sub> thin films above room temperature" W. K. Park, R. J. Ortega-Hertogs, J. S. Moodera, A. Punnoose and M. S. Seehra; *Journal of Applied Physics*, 91, 8093 (**2002**).
88. "Hysteresis anomalies and exchange bias in 6.6nm CuO nanoparticles." A. Punnoose and M. S. Seehra; *Journal of Applied Physics*, 91, 7766 (**2002**).
89. "Finite size effects in CuO nanoparticles (Invited)." A. Punnoose and M. S. Seehra; *Proceedings of the 9<sup>th</sup> International Conference on Composites Engineering*, July 1-6, **2002**, San Diego, CA., pp639.
90. "Temperature dependence of paramagnetic resonance in pure and doped ferrihydrite nanoparticles." A. Punnoose and M. S. Seehra, book chapter in *EPR in the 21<sup>st</sup> Century: Basics and Applications to Materials, Life and Earth Sciences* (Elsevier Science, **2002**) pp162.
91. "ESR observation of W<sup>5+</sup> and Zr<sup>3+</sup> states in Pt/WO<sub>x</sub>/ZrO<sub>2</sub> catalysts." A. Punnoose and M. S. Seehra, *Catalysis Letters*, 78, 157 (**2002**).
92. "Characterization of CuCl<sub>2</sub>/PdCl<sub>2</sub>/activated carbon catalysts used in the synthesis of diethyl carbonate." A. Punnoose, M.S. Seehra, B. Dunn and E. Eyring, *Energy and Fuels*, Vol. 16, 182-188 (**2002**).
93. "Supported binary catalysts for dehydrogenation of methane" N. Shah, F. E. Huggins, D. Panjala, G. P. Huffman, A. Punnoose and M. S. Seehra, American Chemical Society Fuel Chemistry Division preprints, 47 (**2002**) 132.

## 2001

94. "From bulk to nanoscale magnetism and exchange bias in CuO nanoparticles" A. Punnoose, H. Magnone, M.S. Seehra and J. Bonevich; *Physical Review B*, 64, 174420/1-8, (2001).
95. "Deviations from the curie-law variation of magnetic susceptibility in antiferromagnetic nanoparticles" M. S. Seehra and A. Punnoose; *Physical Review B*, 64, 132410/1-4, (2001).
96. "Structure, properties and roles of the different constituents in Pt/WO<sub>x</sub>/ZrO<sub>2</sub> catalysts" A. Punnoose, M. S. Seehra and I. Wender, *Fuel Processing Technology*, 74, 33-47 (2001).
97. "Synthesis and antiferromagnetism of Mn<sub>5</sub>O<sub>8</sub>." A. Punnoose, H. Magnone and M. S. Seehra, *IEEE Transaction on Magnetics*, 37, 2150-2152 (2001).
98. "Effect of Si doping on the EMR properties of ferrihydrite nanoparticles" M. S. Seehra, A. Punnoose, P. Roy, and A. Manivannan; *IEEE Transaction on Magnetics*, 37, 2207-2209 (2001).
99. "Interaction of oxygen with nanophase carbons investigated by electron spin resonance spectroscopy" A. Manivannan, A. Punnoose and M. S. Seehra; *Proceedings of the Materials Research Society*, 593, 365 (2000).
100. "Properties of ITO films prepared by RF magnetron sputtering" F. El Akkad, A. Punnoose and G.Prabu; *Applied Physics A*, 71, 157 (2000).
101. "CdS thin films prepared by RF magnetron sputtering in Ar atmosphere." A. Punnoose, M. Maarafi, G. Prabu and F. El Akkad; *Physica status solidi (a)* 177, 453 (2000).
102. "Effect of substrate temperature on the structural, electrical and optical properties of ITO films prepared by RF magnetron sputtering:" F. El Akkad, M.Maarafi, A. Punnoose and G.Prabu; *Physica status solidi (a)*, 177, 445 (2000).
103. "EPR and superposition model investigations of Mn<sup>2+</sup> ions doped in sodium formate single crystal" B.P.Maurya, A. Punnoose and R.J.Singh; *Spectrochimica Acta A.*, Vol.51, 1317-1322 (1995).
104. "EPR study of Mn<sup>2+</sup> ion doped in potassium oxalate monoperhydrate single crystal." B.P.Maurya, A. Punnoose, Mohd Ikram and R.J.Singh; *Polyhedron*, Vol.14, 2561-2567 (1995).

105. “EPR and optical absorption studies of  $\text{VO}^{2+}$  and  $\text{Cu}^{2+}$  ions doped in  $\text{LiHSO}_4$  Single Crystals.” B.P.Maurya, A. Punnoose and R.J.Singh, *Solid State Communications*, Vol.94, PP.231-235 (1995).
106. “Copper tetramers in high temperature superconductors.” R.J.Singh, Mohd Ikram, A. Punnoose, B.P.Maurya and Shakeel Khan; *Physics Letters A.*, Vol.A208, 369-374 (1995).
107. “EPR study of  $\text{Cu}^{2+}$  ion doped in potassium oxalate monoperhydrate single crystal. B.P.Maurya, A. Punnoose, Mohd Umar and R.J.Singh; *Spectrochimica Acta A.*, Vol. 51A, 661-667 (1995).
108. “EPR studies of High- $T_c$  superconductors and related systems (Review article).” A. Punnoose and R.J.Singh; *International Journal of Modern Physics B.*, Vol. 9, 1123-1157 (1995).
109. “An investigation of the magnetic dilution effect in  $\text{CaO-CuO}$  and  $\text{SrO-CuO}$  systems.” Mohd Ikram, A. Punnoose, B.P.Maurya and R.J.Singh, *Modern Physics Letters B.*, Vol.8, 1709-1717 (1994).
110. “EPR and optical studies of  $\text{VO}^{2+}$  ions in sodium formate single crystal.” B.P.Maurya, A. Punnoose, Mohd Umar and R.J.Singh, *Solid State Communication*, Vol. 89, 59-63 (1994).
111. “ $S = 1$  and  $S = 2$  EPR signals in modified  $\text{CuO}$  and  $\text{BaCuO}_2$ .” R. J. Singh, A. Punnoose, J. Mathew, B. P. Maurya, M.Umar and M. I. Haque, *Physical Review B.*, Vol. 49, 1346-1349 (1994).
112. “A magnetic transition in  $\text{CuO}$  thin films on glass and quartz substrates.” A. Punnoose, B.P.Maurya, Jilson Mathew, Mohd Umar and R.J.Singh, *Journal of Pure and Applied Physics*, Vol. 5, 140-147 (1993).
113. “Crystal Structure of  $\text{KNiBr}_3 \cdot 3\text{H}_2\text{O}$ .” M.I.Haque, Mohd Umar, A. Punnoose, B.P.Maurya and R.J.Singh; *Journal of Pure and Applied Physics*, Vol.5, 190-193 (1993).
114. “An EPR study of manganese (II) complexes in Potassium Chromate single crystal.” Prem Chand, Jilson Mathew, A. Punnoose, B.P.Maurya and R.J.Singh, *Spectrochimica Acta A.*, Vol. 49 A, 1621-1627 (1993).
115. “EPR Observation of  $\text{Cu}^{2+} - \text{Cu}^{2+}$  pairs in cupric oxide powders.” A. Punnoose, B.P.Maurya, Jilson Mathew, Mohd Umar, M.I.Haque and R.J.Singh, *Solid State Communications*, Vol.88, 195-198(1993).

116. "EPR and resistance studies of BaO-CuO systems." A. Punnoose, B.P.Maurya, Mohd Umar and R.J.Singh, *Indian Journal of Pure and Applied Physics*, Vol. 31, 775-778 (1993).
117. "EPR study of CuO bulk powder and thin films." A. Punnoose, Jilson Mathew, B.P.Maurya, Mohd Umar and R.J.Singh, *Modern Physics Letters B*, Vol. 6, 1043-1047 (1992).

## PATENTS

1. US patent number 7,939,560, Fluorescent Particulates Comprising Nanoscale ZnO Layer and Exhibiting Cell-Specific Toxicity.
2. U.S. Patent No. 8,187,638, Preferential Killing of Cancer Cells and Activated Human T Cells Using ZnO Nanoparticles.
3. U.S. Patent #7,582,222 Transition Metal-Doped Oxide Semiconductor Exhibiting Room-Temperature Ferromagnetism.
4. U.S. Patent #7,836,752 Magnetic Gas Sensor and Methods Using Antiferromagnetic Hematite Nanoparticles.
5. 13/079,594 filed April 4, 2011, Nanoparticles that Preferentially Associate with and Kill Diseased Cells for Diagnostic and Therapeutic Applications.

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