CURRICULUM VITAE

LI MA

CONTACT INFORMATION

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EDUCATION

- **Ph.D.** Chemistry/Bioinorganic, The University of Georgia, February 1993
- **M.S.** Physics, Graduate School of Chinese Academy of Sciences, April 1985
- **B.E.** Laser Engineering, Changchun Institute of Optics and Fine Mechanics, January 1982

PROFESSIONAL EXPERIENCE

8/00 - Present: Professor (8/12-present), Associate Professor (8/06–8/12), Assistant Professor (8/00–7/06), Department of Physics, Georgia Southern University, Statesboro, GA.

3/98 – 8/00: Vice President of research and development (1/99-8/00), Director of R&D (3/98-1/99), SynZyme Technologies, Irvine, CA.

9/95 –3/98: Temporary Assistant Professor, Department of Physics, Georgia Southern University, Statesboro, GA.

3/93 –8/95: Postdoctoral Researcher, Department of Molecular Biology & Biochemistry, University of California, Irvine, CA

8/88 –3/93: Teaching and Research Assistant, Department of Chemistry & Center for Metalloenzyme Studies, University of Georgia, Athens, GA

SCHOLARSHIP EXPERTISE

SPECTROSCOPIC APPLICATION IN BIOLOGICAL SYSTEMS

- Characterization and mechanistic studies of Fe, Ni, and Mo metalloenzyme using fluorescence, resonance Raman, circular dichroism, magnetic circular dichroism, X-ray absorption, electron paramagnetic resonance (EPR) and UV/Vis absorption techniques. The studies include metal oxidation states, ligand field, electron transfer, and etc.
- Mechanistic and pharmacokinetic studies of nitroxide free radical as antioxidant in *vitro/vivo* by EPR spectroscopy for pharmaceutical research and development.

SPECTROSCOPIC APPLICATION IN CONDENSED MATTER

- Phosphor preparation and characterization; Optical properties of transition metal and rare earth ions doped LED and up-conversion phosphors.
- Dynamical processes of excited states such as energy transfer and exciton interactions, impurity quenching, and thin film electroluminescence using laser-induced fluorescence and time-resolved spectroscopy.
- Spectroscopic characterizations of thin films, crystal fibers and IR-up converting materials.

PHARMACEUTICAL DEVELOPMENT

- Analytical methods of pharmacokinetics studies in pharmaceuticals

- Pre-clinical research and development process in a new drug investigation
- GLP and GMP regulatory training
- Regulatory submission of a new drug investigation to FDA

GRANT AND CONTRACT AWARDS

EXTRAMURAL AWARDS **($929,457.00 to GSU**)

- Supplementary "Polynitroxyated Pegylated Hemoglobin (PNPH) Synthesis and Physical/Chemical Characterization", PI (subcontractor), National Institutes of Health/SynZyme Technologies LLC, $65,000, 12/2013 – 05/2015
- "Polynitroxyated Pegylated Hemoglobin (PNPH) Synthesis and Physical/Chemical Characterization", PI (subcontractor), National Institutes of Health/SynZyme Technologies LLC, $200,500, 8/2011~7/2015.
- "Electron Parametric Resonance Studies of Synthetic Enzyme: Interaction of Unpaired Electrons in Polynitroxy", PI (subcontractor), National Institutes of Health/USAMRMC/ SynZyme Technologies LLC, $383,957, 8/2006~05/2010.
- "The Development of Analytical Methods and Their Application on PNH as Synthetic Enzymes-Cooperation and Unpaired d-Electrons", PI (Subcontractor), National Institutes of Health/SynZyme Technologies LLC, $130,000, 8/2004~4/2006.
- "Environmental Literacy for All Students: Development of Environmental Science Courses in a New Core Curriculum", Co-PI, NSF/DUE, 150,000, 03/1998~09/2001.

INTRAMURAL AWARDS (**$298,564.00**)

- College Office of Undergraduate Research (COUR), "Reduced Neurotoxicity of modified Hemoglobin", (Student: Leigh Spivy, Mentor: Li Ma), $2,554 summer 2012
- College Interdisciplinary Pilot Funding, (Co-PI) 10,000, 2011
- Georgia Southern University Faculty Development Committee Grant Award, $3,010, 2011
- College Equipment Award, $270,000, 2011
- College Office of Undergraduate Research (COUR), "Structural and Functional Studies of Modified Hemoglobin", (Student: Wayne Morgan, Mentor: Li Ma), $2,500, summer 2010.
- Advisement and Scholarship Promoting Inquiry-based Research Experiences in STEM (ASPIRES), "Hemoglobin Research" (Student: Gil Salazar, Mentor: Li Ma), $3,500, summer, 2010.
- Georgia Southern University Faculty Research Grant, PI, $4,500, spring 2005
- Georgia Southern University Faculty Research Grant, PI, $2,500, fall 2002

BOOK CHAPTERS

1. **L. Ma** and C. Hsia "Polynitroxylated Hemoglobin As A Multifunctional Therapeutic For Critical Care And Transfusion Medicine" Chapter 8 in *Selected Topics in Nanomedicine* World Science Publisher/Imperial College Press, ed. T. Chang, Singapore/London (in press Pre-order 2013).
2. C.J.C. Hsia, F.M. Thompson, D. Wang, **L. Ma**, "Polynitroxylated Pegylated Hemoglobin (PNPH) A Nanomedicine for Critical Care and Transfusion", Chapter 16 in *Hemoglobin-based Oxygen Carriers - Principles, Approaches and Current Status*, ed. H.W. Kim and A.G. Greenburg, Springer Verlag, Berlin/Heidelberg, Germany (in press Pre-order 2013).

PUBLICATIONS IN REFEREED JOURNALS

3. M. Sun, **L Ma**, B.J. Chen, F. Stepongzi, F. Liu, Z.W. Pan, M.K. Lei, X.J. Wang, "Comparison of Up-converted Emissions in Yb^{3+},Er^{3+} Co-doped $Gd_2(WO_4)_3$ and Gd_2WO_6 Phosphors," *J. Lumin. PII: S0022-2313(13)00691-1, DOI: http://dx.doi.org /10.1016 /j.jlumin. 2013.10.047* (in press, available online, 2013).

4. Y.X. Liu, **L. Ma**, D.T. Yan, H.C. Zhu, X.L. Liu, H.Y. Bian, H. Zhang, X.J. Wang, "Effects of Encaged Anions on the Optical and EPR Spectroscopies of RE doped C12A7," *J. Lumin.* *http://www.sciencedirect.com/science/article/pii/S0022231313007199* DOI: 10.1016/j.jlumin 2013.10.066 (invited, in press, available online, 2013).

5. J. Zhao, A. Meyer, **L. Ma,** W.H. Ming, "Acrylic Coatings with Surprising Antifogging and Frostresisting Properties" *ChemComm DOI: 10.1039/C3CC46561F* (in press, available online 2013)

6. E.C. Brockman, H. Bayır, B. Blasiole, S.L. Shein, E.L. Fink, C. Dixon, R.S. Clark, V.A. Vagni, **L. Ma**, C.J. Hsia, S.A. Tisherman, P.M. Kochanek. "Polynitroxylated-pegylated hemoglobin attenuates fluid requirements and brain edema in combined traumatic brain injury plus hemorrhagic shock in mice", *J. Cereb. Blood Flow Metab.* **33**, 1457-64 (2013)

7. Y. Liu, X. Zhang, Z. Hao, Y. Luo, X.J. Wang, **L. Ma**, J.H. Zhang, "Luminescence and Energy Transfer in Ca3Sc2Si3O12:Ce3+,Mn2+ White LED Phosphors," *J. Lumin.* **133**, 21–24 (2013)

8. C.J. Hsia, **L. Ma**, "A Hemoglobin-based Multifunctional Therapeutic: Polynitroxylated Pegylated Hemoglobin," *Artificial Organs* 36 (2), 215-20 (2012) (invited review)

9. M.D. Manole, P.M. Kochanek, L.M. Foley, T.K. Hitchens, H. Bayir, R.H. Garman, **L. Ma**, C.J.C. Hsia, C. Ho, R.S.B. Clark, "Polynitroxyl Albumin and Albumin Have Divergent Effects on Cerebral Blood Flow and Improve Neurological Outcome after Asphyxial Cardiac Arrest," *J. Cereb. Blood Flow Metab*. **32**, 560-9 (2012).

10. **L. Ma**, X.J. Wang, "Characteristic Emission in Glutaraldehyde Polymerized Hemoglobin," *J. Lumin*. **131**, 461–464 (2011).

11. K.H. Walson, M. Tang, A. Glumac, H. Alexander, M.D. Manole, **L. Ma**, C.J. Hsia, R.S. Clark, P.M. Kochanek, V.E. Kagan, H. Bayır, "Normoxic Versus Hyperoxic Resuscitation in Pediatric Asphyxia Cardiac Arrest: Effects on Oxidative Stress," *Crit. Care Med*. **39**, 335-343 (2011).

12. D.K. Shellington, L. Du, X. Wu, J. Exo, V. Vagni, **L. Ma**, K. Janesko-Feldman, R.S.B. Clark, H. Bayır, C.E. Dixon, L.W. Jenkins, Carleton J.C. Hsia, P.M. Kochanek, "Polynitroxylated Pegylated Hemoglobin: A Novel Neuroprotective Hemoglobin for Acute Volume-Limited Fluid Resuscitation after Combined Traumatic Brain Injury and Hemorrhagic Hypotension in Mice," *Crit. Care Med*. **39**, 494-505 (2011).

13. D.A. Stoyanovsky, A. Kapralov, Z. Huang, A. Maeda, A. Osipov, C.J.C. Hsia, **L. Ma**, P.M. Kochanek, H. Bayr, V.E. Kagan, "Unusual Peroxidase Activity of Polynitroxylated Pegylated Hemoglobin: Elimination of H_2O_2 Coupled with Intramolecular Oxidation of Nitroxides," *Biochem. Biophys. Res. Commun*. **399**, 139-143 (2010).

14. J.L. Exo, D.K. Shellington, H. Bayır, V.A. Vagni, K. Janesco-Feldman, **L. Ma**, C.J. Hsia, R.S.B. Clark, L.W. Jenkins, C.E. Dixon, and P.M. Kochanek, "Resuscitation of Traumatic Brain Injury AND Hemorrhagic Shock with Polynitroxylated Albumin, Hextend, Hypertonic

Saline, and Lactated Ringer's: Effects on Acute Hemodynamics, Survival, and Neuronal Death in Mice," *J. Neurotrauma* **26**, 2403–2408 (2009).

15. R. Kentner, P. Safar, W. Behringer, X. Wu, J. Henchir, **L. Ma**, C.J.C. Hsia, S.A. Tisherman, "Small Volume Resuscitation with Tempol Is Detrimental During Uncontrolled Hemorrhagic Shock in Rats," *Resuscitation* **72**, 295-305 (2007).
16. D.K. Kaul, X.D. Liu, X. Zhang, **L. Ma**, C.J.C. Hsia, R.L. Nagel, "Inhibition of Sickle Red Cell Adhesion and Vasoocclusion in the Microcirculation by Antioxidants," *Am. J. Physiol. Heart Circ. Physiol*. **291**, H167-H175 (2006).
17. H. Mahaseth, G.M. Vercellotti, T.E. Welch, P.R. Bowlin, K.M. Sonbol, C.J. Hsia, **L. Ma**, J.C. Bischof, R.P. Hebbel, and J.D. Belcher, "Polynitroxyl Albumin Inhibits Inflammation and Vaso-Occlusion In Sickle Mice," *J. Lab. Clinical Med*. **145**, 204-11 (2005).
18. P.W Buehler, C.R Haney, A. Gulati, **L. Ma**, C.J. Hsia, "Polynitroxyl Hemoglobin: a Pharmacokinetic Study of Covalently Bound Nitroxides to Hemoglobin Platforms," *Free Radic. Biol. Med*. **37**, 124-35 (2004).
19. A. Weinberg, K.D. Nylander, C. Yan, **L. Ma**, C.J. Hsia, V.A. Tyurin, V.E. Kagan, N.F. Schor, "Prevention of Catecholaminergic Oxidative Toxicity by 4-Hydroxy-2,2,6,6-Tetramethylpiperidine-1-oxyl and Its Recycling Complex with Polynitroxylated Albumin, TEMPOL/PNA," *Brain Res.* **1012**, 13-21 (2004).
20. R. Kentner, P. Safar, W. Behringer, X. Wu, V.E. Kagan, Y.Y. Tyurina, J. Henchir, **L. Ma**, C.J. Hsia, S.A.Tisherman, **"**Early Antioxidant Therapy with Tempol during Hemorrhagic Shock Increases Survival in Rats," *J. Trauma* **53**, 968-77 (2002).
21. H.Q. Li, **L. Ma**, C.J.C. Hsia, J.L. Zweier, and P. Kuppusamy, "Polynitroxyl-Albumin (PNA) Enhances Myocardial Infarction Therapeutic Effect of Tempol in Rat Hearts Subjected to Regional Ischemia-Reperfusion," *Free Radic. Biol. Med.* **32**, 712-19 (2002).
22. J.H. Park, **L. Ma**, T. Oshima, P. Carter, L. Coe, J.W. Ma, R. Specian, M.B. Grisham, C.E. Trimble, C.J.C. Hsia, J.E. Liu, and J.S. Alexander, "Polynitroxylated Starch/TPL Attenuates Cachexia and Increased Epithelial Permeability Associated with TNBS Colitis," *Inflammation* **26**, 1-11 (2002).
23. T. Sugawara, F.S. Yu, **L. Ma**, C.J.C. Hsia, P.H. Chan, "Delayed Treatment with Polynitroxyl Albumin Reduces Infarct Size after Stroke in Rats," *Neuroreport* **12**, 3609-12 (2001).
24. P.W. Buehler, S. Mehendale, H.S. Wang, .J.T. Xie, **L. Ma**, C.E. Trimble, C.J.C. Hsia, and A. Gulati, "Resuscitative Effects of Polynitroxylated Alpha Alpha-Cross-Linked Hemoglobin Following Severe Hemorrhage in the Rat" *Free Radic. Biol. Med.* **29**, 764-74 (2000).
25. S. Zhang, H.Q. Li, **L. Ma**, C.E. Trimble, P. Kuppusamy, C.J.C. Hsia, and D.L. Carden "Polynitroxyl-Albumin (PNA) plus Tempol Attenuate Lung Capillary Leak Elicited by Prolonged Intestinal Ischemia and Reperfusion," *Free Radic. Biol. Med.* **29,** 42-50 (2000).
26. N. Okayama, J. Park, L. Coe, D.N. Geanger, **L. Ma**, C.J.C. Hsia, and J.S. Alexander, "Polynitroxyl aa-Hemoglobin (PNH) Inhibits Peroxide and Superoxide-Mediated Neutrophil Adherence to Human Endothelial Cells," *Free Radical Research* **31**, 53-58 (1999).
27. R.A. Maxwell, J.B. Gibson, A.R. Swallows, **L. Ma**, C.J.C. Hsia, T.C. Fabian, K.G. Proctor "Effects of a Novel Anti-oxidant Following Severe Blunt Chest Trauma," *Shock* **11**, 11 (1999).

28. S. Zhang, D. Carden, **L. Ma**, C. Trimber, and C.J.C. Hsia "Polynitroxyl-Albumin (PNA) Plus Tempol Inhibit Lung Injury Secondary to Intestinal Ischemia/Reperfusion," *Shock* **11,** 62 (1999).

29. R.K. Saetzler, K.E. Arfors, R.F. Tuma, U. Vasthare, **L. Ma**, C.J.C. Hsia, and H. Lehr "Polynitroxylated Hemoglobin-Based Oxygen Carrier: Inhibition of Free Radiccal-Induced Microcirculatory Dysfunction," *Free Radic. Biol. Med.* **27**, 1-6 (1999).

30. K.B. Musgrave, H.I. Liu, **L. Ma**, B.K. Burgess, G. Watt, B. Hedman, and K.O. Hodgson, "EXAFS Studies on the P-N and P-OX States of the P-Clusters in Nitrogenase," *Journal of Biological Inorganic Chemistry* **3**, 344-352 (1998).

31. P. Kuppusamy, P. Wang, R.A. Shankar, **L. Ma**, C. Trimble, C.J.C. Hsia, and J.L. Zweier, "In Vivo Topical EPR Spectroscopy and Imaging of Nitroxide Free Radicals and Polynitroxyl-Albumin," *Magnetic Resonance in Medicine* **40,** 806-11 (1998).

32. P. Kuppusamy, P. Wang, J. Zweier, M. Krishna, J. Mitchell, **L. Ma**, C. Trimble, and C.J. Hsia, "Electron Paramagnetic Resonance Imaging of Rat Heart with Nitroxide and Polynitroxide-Albumin", *Biochemistry* **35**, 7051-7 (1996).

33. **L. Ma**, M.A. Brosius, B.K. Burgess, "Construction of a form of the MoFe protein of Nitrogenase that Accepts Electrons from the Fe Protein but Does Not Reduce Substrate," *J. Biol. Chem.* **271,** 10528-32 (1996).

34. **L. Ma**, N. Gavini, H.L. Liu, B. Hedman, K.O. Hodgson, and B.K, Burgess, "Large Scale Isolation and Characterization of the Molybdenum-Iron Cluster from Nitrogenase," *J. Biol. Chem.* **269**, 18007-15 (1994).

35. N. Gavini, **L. Ma**, G. Watt, and B.K. Burgess, "Purification and Characterization of a FeMo Cofactor-Deficient MoFe Protein," *Biochemistry.* 33, 11942-9 (1994).

36. M.C. Brenner, **L. Ma**, M.K. Johnson, and R.A. Scott, "Spectroscopic Characterization of the Alternatives of S-Methylcoenzyme M Reductase from Methanobacterium Thermoaututrophicum (Strain Delta H)," *Biochim. Biophys. Acta* **1120**, 160 (1992).

37. C.L. Hamilton, **L. Ma**, M.W. Renner, and R.A. Scott, "Ni(II) and Ni(I) Forms of Pentaalkylamide Derivatives of Cofactor F_{430} *of Methanobacterium Thermoaututrophicum," Biochim. Biophys. Acta* **1074**, 312-9 (1991).

38. M. Tissue, L. Lu, **L. Ma**, W. Jia, M.L. Norton, and W. M. Yen, "Laser-Heated Pedestal Growth of Laser and IR-Up Converting Materials," *J. Crystal Growth* **109**, 323 (1991).

39. **L. Ma**, Z. Tang, and X. Fan, "The interaction between Excitons in ZnSe EPI under Different Excitation Intensity," *J. Lumin*. **40**&**41**, 523 (1988).

40. X. Fan, Z.K Tang, and **L. Ma**, "Recombination Process of the Blue Emission at Room Temperature in VPE ZnSe Epilayers," *Chin. J. Lumin*. **7**, 336 (1986).

41. **L. Ma**, G. Zhong, and S.H. Xu, "The Excitation Process of Tm Ion in ZnS:Tm Thin Film Electroluminescence," *Chin. J. Lumin*. **6**, 192 (1985).

42. F. Zhou, Q. Zhu, Q. Qiu, **L. Ma**, C. Gu, "One dimensional measurement of laser field profiles by CCD," *Chin. J. Laser*s **3**, 183-185 (1984).

CONFERENCE PROCEEDINGS IN REFEREED JOURNALS

1. J. Zhang, S. Cao, **L. Ma**, C.J. Hsia, and R.C. Koehler "Protection from Transient Focal Cerebral Ischemia by Transfusion of Polynitroxylated Pegylated Hemoglobin" *Stroke* **44**:A154 (2013).

2. E. Brockman, C. Dixon, H. Bayir, B. Blasiole, R. Clark, V. Vagni, **L. Ma**, C Hsia, P. Kochanek, "Polynitroxylated pegylated hemoglobin attenuates fluid requirement and brian edema in combined traumatic brain injury plus hemorrhagic shock in mice" *Crit. Care Med.* **40**, 12, U148 (2012).

3. J.L. Exo, D.K. Shellington, V.A. Vagni, K. Janesco-Feldman, **L. Ma**, C.J. Hsia, R.S.B. Clark, H. Bayir, L.W. Jenkins, C.E. Dixon, and P.M. Kochanek, "Resuscitation of traumatic brain injury and hemorrhagic shock with crystalloid and colloid therapies: effects on acute resuscitation parameters, survival, and neuronal death," *J. Neurotrauma* **26**, A59, P228 (2009).

4. P.M. Kochanek, X.R. Wu, L.N. Du, **L. Ma**, D.K. Shellington, V. Vagni, K. Janesko-Feldman, R.S.B. Clark, H. Bayir, C. Hsia, "Pnph, a neuroprotectant hboc: studies of in vivo and in vitro traumatic brain injury," *J. Neurotrauma* **26**, A59, P230 (2009).

5. D.K. Shellington, J. Exo, V. Vagni, **L. Ma**, K. Feldman, R. Clark, H. Bayir, C.E. Dixon, L. Jenkins, A. Abuchowski, C. Hsia, P. Kochanek, "Polynitroxylated pegylated hemoglobin solution for the acute limited fluid resuscitation of hemorrhagic shock after traumatic brain injury in a mouse model," *J. Neurotrauma* **25**, 868 (2008).

6. V. Vagni, K. Feldman, L. Jenkins, C.E. Dixon, J.L. Exo, D. Shellington, R.S.B. Clark, H. Bayir, P.M. Kochanek, **L. Ma**, C. Hsia, "Resuscitation of traumatic brain injury and hemorrhagic shock with novel colloids: effects on acute hemodynamics and survival," *Crit. Care Med*. **36**, A144 (2008).

7. D.K. Shellington, X. Wu, J. Exo, V. Vagni, K. Feldman, R. Clark, H. Bayir, C.E. Dixon, L. Jenkins, P. Kochanek, **L. Ma**, C. Hsia, A. Abuchowski, "Polynitroxylated pegylated hemoglobin for the acute limited fluid resuscitation of hemorrhagic shock after traumatic brain injury in mice," *Crit. Care Med*. **36**, A5 (2008).

8. J.L. Exo, D.K. Shellington, V.A. Vagni, K. Janesco-Feldman, **L. Ma**, C.J. Hsia, R.S.B. Clark, H. Bayir, L.W. Jenkins, C.E. Dixon, and P.M. Kochanek, "Resuscitation of combined traumatic brain injury and hemorrhagic shock with polynitroxyl albumin: Effect on fluid requirements, blood pressure, survival and neuropathology," *J. Neurotrauma* **25**, 888 (2008).

9. V. Vagni, K. Feldman, L. Jenkins, C.E. Dixon, J.L. Exo, D. Shellington, R.S.B. Clark, H. Bayir, P.M. Kochanek,; **L. Ma**, C. Hsia, "Nitroxide-based resuscitation of combined traumatic brain injury and hemorrhagic shock: Effect on acute hemodynamics," *Crit. Care Med*. **35**, A6 (2007).

10. P. Kuppusamy, H.Q. Li, G. Ilangovan, **L. Ma**, and C.J.C. Hsia, "PNA as a tumor radiosensitizer: Enhancement of vascular volume and oxygenation," *Free Radic. Biol. Med.* **31**, S139 (2001).

11. H.Q. Li, **L. Ma**, C.J.C. Hsia, J.L. Zweier, and P. Kuppusamy, "Polynitroxyl human serum albumin plus Tempol reduce infarct volume following regional myocardial ischemia and reperfusion in the rat," *Faseb Journal* **15**, A570, (2001).

12. H.Q. Li, **L. Ma**, P. Kuppusamy, C.E. Trimble, J.L. Zweier, and C.J.C. Hsia, "Polynitroxylation neutralizes the hypertensive effect of alpha alpha-crosslinked hemoglobin without affecting nitric oxide scavenging," *Free Radic. Biol. Med.* **27**, 234 (1999).

13. S. Wattanasirichaigoon, M.J. Menconi, **L. Ma**, C.J.C. Hsia, M.P. Fink, "Amelioration by Polynitroxyl Starch of Intestinal Hyperpermeability in A Rat Model of Severe Hemorrhagic Shock," *Gastroenterology* **116**, S0316, (1999).

14. P. Buehler, S. Mehendale, H. Wang, A. Gulati, **L. Ma**, C.E. Trimble and C.J.C. Hsia "Polynitroxylation Reduces the Presson Activity of αα-crosslinked Hemoglobin: Hemorrhagic Shock resuscitation in the Rat," *Shock* **11,** 54 (1999).

15. C.J.C. Hsia, **L. Ma**, C. E. Trimble, T. Kondo and Pak H. Chan, "Polynitroxyl Albumin (PNA) Reduces Infarction, Edema and Neurological Deficit Following Transient Focal Cerebral Ischemia in the Mouse and Rat," *J. Cereb. Blood Flow and Metab.***18**, 1022 (1998).

16. P. Wang, R. Shanka, P, Kuppusamy, **L. Ma**, C.J.C. Hsia, and J.L. Zweier, "Polynitroxyl-Albumin Decreases Myocardial Infarct Size in an *in vivo* Model of Ischemia/Reperfusion Injury," *J. Investigative Medicine* **46,** A195 (1998).

17. C.J.C. Hsia, **L. Ma**, C. Trimble, T. Kondo, and P.H. Chan, "Polynitroxyl Albumin (PNA) Reduces Infarction, Edema And Neurological Deficit in Mouse and Rat Models of Transient Focal Cerebral Ischemia," *J. Investigative Medicine* **46,** A206 (1998).

18. C.P. Turner, **L. Ma**, C.J.C. Hsia, S.S. Panter, and F.R. Sharp, "Evaluation of the safety and efficacy of polynitroxyl-albumin (PNA) in a model of stroke due to subarachnoid hemorrhage," *J. Investigative Medicine* **46,** A231 (1998).

19. R. Shanka, P. Wang, P, Kuppusamy, **L. Ma**, C.J.C. Hsia, and J.L. Zweier, "Polynitroxyl-Albumin (PNA) Enhances Tempol (TPL) Protection Against Myocardial Ischemia/Reperfusion Injury," *J. Investigative Medicine* **46,** A195 (1998).

20. N. Okayama, J.S. Alexander, J. Russell, D.N. Granger, **L. Ma**, C. Trimble, C.J.C. Hsia, "Polynitroxyl albumin (PNA) Inhibits Ischemia-Reperfusion Induced Leukocyte-Endothelial Cell Adhesion," *J. Investigative Medicine* **46,** A206 (1998).

21. C.P. Turner, **L. Ma**, C.J.C. Hsia, F.R. Sharp, and S.S. Panter, "Evaluation of the Safety and Efficacy of Polynitroxyl-Albumin (PNA) in a Model of Subarachnoid Hemorrhage," *J. Neurochemistry* **70**, S58, (1998).

22. P. Kuppusamy, P. Wang, J. Zweier, **L. Ma**, C. Trimble, and C.J.C. Hsia, "High-Resolution EPR Imaging of an Ischemic Rat Heart," *Analytical Chemistry* 464 A Analytical Chemistry News & Features, August 1, 464A (1996).

23. P. Kuppusamy, **L. Ma**, P. Wang C. Trimble, J.L. Zweier, and C.J.C. Hsia, "Pharmacokinetic and Pharmacodynamic Studies on Free and Macromolecule-Bound Nitroxides by Electron Paramagnetic Resonance Imaging," *Special Issue of Artificial cell, blood Substitutes and Immobilization Biotechnology* **24**, 371 (1996).

24. J.L. Zweier, P. Wang. **L. Ma**, C.E. Trimble, P. Kuppusamy, and J.C. Hsia, "Evaluation of Polynitroxylated Protein in the Prevention of Mycardial Ischemia/Reperfusion Injury," *Special Issue of Artificial cell, blood Substitutes and Immobilization Biotechnology* **24**, 464 (1996).

25. C.M. Krisha, **L. Ma**, A. Samuni, C.E. Trimble, J.B. Mitchell, and C.J. Hsia, "Superoxide Dismutase- and Catalase-Mimetic Activity of a Polynitroxyl Hemoglobin (PNH)," *Special Issue of Artificial cell, blood Substitutes and Immobilization Biotechnology* **24**, 369 (1996).

26. M. Sendoya, E.P.Day, K. Kiick, M. Johnson, **L. Ma**, R. Scott, R. Hausinger, M. Todd, J. Peterson, "Saturation Magnetization of Ni(II) in Metalloproteins and Model Compounds," *Faseb Journal*, **6,** A192 (1992).

CONFERENCE PRESENTATIONS

1. **L. Ma** "Converting Intracellular Hemoglobin Into Intravascular Protein by Polynitroxylation Technology", ***Invited Talk,*** The XIVth International Symposium on Blood Substitutes and Oxygen Therapeutics, Chengdu, China, Oct.18-21, 2013.
2. **L. Ma** and C. Hsia "VitalHeme, as red cell alternative and a therapeutic nano-medicine", Oral presentation, International Symposium on Artificial Oxygen Carriers, Yokohama, Japan, Sept. 28, 2013.
3. C. Hsia and **L. Ma** "Transfusion require the development of a new generation of oxygen carrier" Oral presentation, International Symposium on Artificial Oxygen Carriers, Yokohama, Japan, Sept. 28, 2013.
4. M. Sun, **L. Ma**, F. Stepongzi, M.K. Lei, and X.J. Wang, "Comparison of Up-converted Emissions in Yb^{3+},Er^{3+} Co-doped $Gd_2(WO_4)_3$ and Gd_2WO_6 Phosphors" Presented poster, 18th International Conference on Dynamical Processes in Excited States of Solids (DPC'13) Fuzhou, Fujian, China, August 4-9, 2013.
5. X.J. Wang, Y.X. Liu and **L. Ma**, "EPR and Optical Spectroscopies of Rare Earth Doped $12CaO•7Al_2O_3$", ***Invited Talk***, 18th International Conference on Dynamical Processes in Excited States of Solids (DPC'13), Fuzhou, Fujian, China, August 4-9, 2013.
6. E. Brockman, C.E. Dixon, H. Bayir, B. Blasiole, R.S. Clark, E. Fink, S. Shein, V. Vagni, **L. Ma**, C. Hsia, P. Kochanek "Polynitroxylated Pegylated Hemoglobin Attenuates Fluid Requirements and Brain Edema in Combined Traumatic Brain Injury Plus Hemorrhagic Shock in Mice", the Society of Critical Care Medicine Critical Care Congress, San Juan, PR. January 2013.
7. E.C. Brockman, C.E. Dixon, H. Bayir, B. Blasiole, R.S. Clark, V. Vagni, **L. Ma**, C. Hsia, P. Kochanek "Polynitroxylated pegylated hemoglobin attenuates fluid requirements and brain edema in combined traumatic brain injury plus hemorrhagic shock in mice", Neurotrauma 2012, Phoenix, Arizona, July 22-25, 2012.
8. **L. Ma** and C. Hsia "A therapeutic hemoglobin nano particle for critical care, emergency, and transfusion medicine", ***Invited talk,*** International Conference of Nanobiotechnology and Microsystem Innovative Industrialization, Chongqing, China October 22-23, 2011.
9. P. Kochanek, H. Bayir, D. Shellington, C. Lewis, X. Wu, L. Du, V. Vagni, K.J. Feldman, **L. Ma**, V. Kagan, C. Hsia, R.S. Clark "Polynitroxylated Pegylated Hemoglobin (PNPH): A Novel Neuroprotective Hemoglobin in Experimental Traumatic Brain Injury Resuscitation", XIII ISBS meeting in Boston, MA, July 27-29, 2011.
10. B. Blasiole, V.A. Vagni, K. Feldman, **L. Ma**, C. Hsia, P. Kochanek "Resuscitation of experimental traumatic brain injury and hemorrhagic shock in mice: Acute effects of polynitroxylated pegylated hemoglobin and 100% oxygen", SCCM 40th Congress, San Diego, CA, Jan 2011.
11. C. Hsia and **L. Ma** "HemoZyme 3.1: A Paradigm Shift in Transfusion and Critical Care Medicine", 16th International Biomedical Science & Technology Symposium, Istanbul, Turkey, Sep 29-Oct 2, 2010.
12. X. Wu, L. Du, **L. Ma**, D.K. Shellington, V. Vagni, R.S. Clark, H. Bayir, C. Hsia, P. Kochanek "PNPH, A neuroprotectant HBOC: Studies of in vivo and in vitro traumatic brain injury", The 2nd Joint Symposium of the International and National Neurotrauma Societies, Santa Barbara, California, September 7-11, 2009.

13. G. Winggins, F. Stepongzi, L. Wang, J.H. Wang, X.J. Wang, and **L. Ma**, "Luminescence properties and energy transfer processes in doubly doped YAG:Ce^{3+}, Pr^{3+}," 26th Rare Earth Research Conference, Santa Fe, New Mexico, USA, June 19-23, 2011.

14. G. Salazar, J. Barr, W. Morgan, and **L. Ma**, "Characterization of Polyethylene Glycol Modified Hemoglobins," American Physical Society March Meeting, Dallas, TX, USA, March 21-25, 2011.

15. W. Coggins, J. Lang, and **L. Ma**, "Luminescent Properties of $Ca_3Sc_2Si_3O_{12}$: Mn^{2+}, Ce^{3+} for a White LED," American Physical Society March Meeting, Dallas, TX, USA, March 21-25, 2011.

16. B. Blasiole, V. Vagni, K. Feldman, **L. Ma**, C. Hsia, P. Kochanek, "Resuscitation of experimental traumatic brain injury and hemorrhagic shock in mice: Acute effects of polynitroxylated pegylated hemoglobin and 100% oxygen," The 39th SCCM Annual Congress, Miami, Florida, USA, January 9-13, 2010.

17. **L. Ma** and C.J. Hsia, "HemoZyme 3.1: a paradigm shift in transfusion and critical care medicine," The 16th International Biomedical Science and Technology Symposium, Istanbul, Turkey, Sept. 28 - Oct 2, 2010.

18. J. Smith, J. Liddel, R. Lemmen, E. Wells, and **L. Ma**, "Analysis of Spin Labeled Human Serum Albumin by EPR Spectroscopy" The 76th Annual Meeting of the Southeastern Section of the American Physical Society, Atlanta, GA, USA, November 2009.

19. **L. Ma**, R. Deal, F. Thompson, and C. Hsia, "Working beyond Basic Research: Production Partnership between University and Industry," the Society of Quality Assurance 25th Annual Meeting, San Diego, California, USA, April 19-24, 2009.

20. C. Hsia, **L. Ma**, "PNPH - A therapeutic for inadequate blood flow and superoxide, nitric oxide dependent vascular dysfunctions", XII Isbs International Symposium On Blood Substitutes, Parma, Italy, October, 2009.

21. X. Wu, **L. Ma**, L. Du, D. Shellington, V. Vagni, R. Clark, C. Hsia, "PNPH, A Neuroprotectant HBOC: Studies of In Vivo and In Vitro Traumatic Brain Injury", PM. Kochanek, XII Isbs International Symposium On Blood Substitutes, Parma, Italy, Oct. 2009.

22. **L. Ma** and Carleton Hsia "Taming the hemoglobin: therapeutic and imaging applications of redox coupled nitroxide and hemoglobin" oral presentation in the X^{th} International Symposium on Blood Substitutes, Brown University, Providence, RI, USA, June 12 – 15, 2005.

23. Laren Hinds, **L. Ma**, "Fluorescent Marker of Heme Degradation in Cell Free Hemoglobin," orally presented by the student (Lauren Hinds) in the National Conferences on Undergraduate Research (NCUR), Indianapolis, IN, April 15-14, 2004.

24. C.J.C. Hsia and **L. Ma**, "Polynitroxyl Albumin for Early Treatment of Vaso-Occlusive Crisis in Sickle Cell Disease: Mechanisms of Action and Pharmacokinetic Studies," the 27th Annual Meeting of the National Sickle Cell Disease Program, Los Angeles, CA, April 18-21, 2004.

25. M.E. Fabry, D.K. Kaul, **L. Ma**, E. Nagabu, J.M. Rifkind, C.J.C. Hsia, R.L..Nagel, "Polynitroxyl Albumin Inhibits Hemoglobin Oxidative Degradation in Red Cells of Transgenic Sickle Mice," the 27th Annual Meeting of the National Sickle Cell Disease Program, Los Angeles, CA, April 18-21, 2004.

26. D,K, Kaul, M,E, Fabry, **L. Ma**, C.J.C. Hsia, R.L. Nagel, "Polynitroxyl Albumin Inhibits Red Cell-Endothelium Adhesion in an ex vivo Rat Model of Vaso-Occlusion of Sickle Cell Anemia," the 27th Annual Meeting of the National Sickle Cell Disease Program, Los Angeles, CA, April 18-21, 2004.
27. **L. Ma**, S. Wilcock, C. Hsia, and M. Rezvani, "Non-invasive Therapy for the Prevention of Post b-Radiation Exposure Moist Desquamation in Pig Skin," the 48th Annual Meeting of the Health Physics Society, San Diego, CA, July 20 -24 2003.
28. **L. Ma** S. Wilcock, C. Hsia, and M. Rezvani, "A Novel Topical Protectant for the Prevention of Post b-Radiation Exposure Moist Desquamation in Pig Skin," the 12th International Congress of Radiation Research, Brisbane, Australia, August 17 – 22, 2003.
29. **L. Ma**, S.Y. Kim, C. Hsia, G.A. Lutty, "Polynitroxyl Albumin Inhibits Sickle Red Blood Cell Adhesion," the 31st Annual Sickle Cell Disease Association of America National Convention, Beverly Hills, CA, September 24-27, 2003.
30. **L. Ma** and X.J. Wang, "Multicolor Long Persistent Phosphors," The 70th Annual Meeting of the Southeastern Section of the American Physical Society (SESAPS), Wrightsville Beach, NC, November 6-8, 2003.
31. Joseph C. Bell and **L. Ma**, "Fluorescence Study of Evans Blue Dyed-Albumin on Lung Permeability," orally presented by the student (Joseph Bell) in the 67th Annual Meeting of the Southeastern Section of the American Physical Society (SESAPS), Mississippi State University, Starkville, MS, November 2-4, 2000.

PATENTS

1. Carboxylate-gated-nitroxide (CGN) compounds and compositions and methods of use thereof UNITED STATES PATENT 7,314,633 **(**Issued, January 1, 2008)
2. Carboxylate-gated-nitroxide (CGN) compounds and compositions and methods of use thereof UNITED STATES PATENT 7,229,629 **(**Issued, June 12, 2007)
3. Compositions and methods of use of neurovascular protective multifunctional polynitroxylated pegylated carboxy hemoglobins for transfusion and critical care medicine UNITED STATES PATENT 8,273,857 (Issued, September 25, 2012)

COLLABORATION

I have established close collaborations with following research units in the past few years:

1. Patrick M. Kochanek, MD, FCCM, Professor and Vice Chairman Department of Critical Care Medicine, Professor of Anesthesiology, Pediatrics and Clinical and Translational Science, Director, Safar Center for Resuscitation Research. Department of Critical Care Medicine, University of Pittsburgh School of Medicine.
2. Raymond C. Koehler, PhD, professor, Department of Anesthesiology/Critical Care Medicine The Johns Hopkins University School of Medicine
3. Carleton Hsia, PhD, SynZyme Technologies LLC, Irvine CA

STUDENTS SUPERVISED IN RESEARCH (2008 – PRESENT)

MENTORED STUDENTS WHO WERE RESEARCH SCHOLARSHIP RECIPIENTS OF COLLEGE OFFICE OF UNDERGRADUATE RESEARCH (COUR)

1. Gil Salazar (AEPIRES grant 2010)
2. Wayne G Morgan (COUR grant 2010 and won the 1st place in COUR symposium)
3. Grayson Wiggins (COUR grant 2011, jointly mentored with Dr Wang in physics)
4. Leigh A Spivy (COUR grant, 2012 and won the 3rd place in COUR symposium)
5. Fadhumo E Ragge (COUR grant, 2013)

SUPERVISED STUDENTS FROM DIFFERENT DEPARTMENTS

1. **Physics:** Vanessa Cooper (2008), Carl J Delabar (2009), Joshua Davidson (2009), Evon R Wells (2010), Gil R Salazar (2010-2013), Wayne G Morgan (2010-2011), James Barr (2011), Anthony Coggins (2010-2011), Frank Stepongzi (2010–present), Grayson Wiggins (2011), Noel S Murray (2011), Fadhumo E Ragge (2012), Zachry D Sisk (2012),
2. **Chemistry:** Tyler C Krauth (2009), Marquisa R Woodard (2010), Leigh A Spivy (2011-2012), Cathryn K Ryan (2011), Iricelle S Fomba, (2012),
3. **Biology:** Adrienne H Mott (2008), Oladayo J Ariyo (2013).
4. **Nursing:** Crystal A Salazar (2010)

Students gave presentations at international, national, or regional research conferences, and collage symposium or departmental colloquium. Some of them were admitted to graduate or medical schools.

PROFESSIONAL MEMBERSHIPS

1. American Physical Society
2. Health Physics Society
3. Oxygen Society
4. Quality Assurance Society
5. Advanced Physics Laboratory Association
6. National Professional Science Master's Association

REFEREED JOURNAL REVIEWER

1. Artificial Organs, ISSN: 1525-1594
2. Materials Research Bulletin, ISSN: 0025-5408
3. Journal of Luminescence, ISSN: 0022-2313

LAB FACILITY AND MAJOR EQUIPMENT (OVER 1MILLIONS)

OPTICAL AND MAGNETIC PROPERTIES OF MATTER

- Electron paramagnetic spectrometer equipped with X-bans solid state ultra-low noise microwave bridge and high sensitivity probe-head optical window (EMXplus 10/12Bruker Corporation)
- Cryo-free helium variable temperature system in-cavity cryostat (ER 4112HV-CF65 Bruker Corporation)
- 8453 UV-Vis Diode Array System (8453 Agilent)

- Spectrofluorimeter (GSU, FluoroMax-3 Jobin Yvon Horiba) with oxford instrument helium cooled, vacuum loading continuous flow (CF) cryostat sample system.
- FluoroLog 3 TCSCP system
- Optical Cryostat (10K-300K) (CS202AI-DMX-1SS Advanced Research System Inc)
- Monochromator (242 Digikrom)
- Photon counter (M series Spectrum Instrument Inc)
- Nanosecond flash lamp (nF900 Edinburgh Instruments Ltd)

PROTEIN PURIFICATION AND CHARACTERIZATION

- Sartoflow Alpha filtration system for 0.5–5L batch size
- Sartoflow Beta filtration system for 5–20L batch size
- Class 10,000 clean room with class 100 filling area for biological
- Napco Class 100 reaction isolator with sterilization and incubation
- Fisher distillator plus Milli-Q® Ultrapure water purification system,
- Number of chromatograph purification system, Pharmacia preparation scale HPLC, a number of stability cambers and a large variety of preparation pumps, filter houses.
- Agilent HPLC with CCD UV-Vis, fluorescence, ELSD detectors and auto-sampler
- Bio-Rad protein electrophoresis and blotting equipment,
- Cooximeter
- Colloid Osmometer
- Medical Tonometer
- Oxygen Analyzer
- Hemox analyzer

TEACHING

COURSES TAUGHT

I have extensive experience in teaching at undergraduate level for majors and non-majors. The courses taught include:

- Introductory/Principle Physics, PHYS1111, 1112, 2211, 2212 (texts: Serway, Fishbane, Gicolli, Young/Freedman, and Randall)
- Introductory Physics Laboratories, PHYS1113 and 1114 (text: departmental manual)
- Advanced Physics Laboratories, PHYS3420 I and II (text: manual prepared by myself together with colleagues)
- Analog and Digital Electronics, PHYS 3542
- Principles and Practice of Instrumental Analysis, PHYS 5490B
- Independent Studies for majors in Physics, Chemistry, Biology, and Nursing

COURSES DEVELOPED

- PHYS3420, Advanced Physics Labs, Part I and Part II, core courses required for BS in physics. The course is offered every semester for physics and engineering majors. Developed new labs, tested procedures, wrote up laboratory manuals, and directed projects and presentations. List of representative projects performed in past few years:

    1) Electron Paramagnetic Resonance Spectroscopy
    2) An Optical Probe of Transient Heat Conduction
    3) Measuring the Speed of Light by Modulated Laser and Optical Fiber
    4) Wavelength Determination of Microwaves

5) Measuring Refractive Index of Liquids with gradient densities
6) Infrared Emission of a Semiconductor Green Laser
7) Optical Spectroscopy of Atoms
8) Measuring the Speed of Sound in Air at Different Temperatures
9) Measuring the Speed of Sound in Liquid
10) Wireless Transmission of Energy Through Resonant Coupling at High Frequency
11) Brewster Angle at different Wavelengths
12) Measuring Lifetime of Emission Centers in Phosphors

- PHYS3542, Analog and Digital Electronics. Developed the laboratory manuals.
- Actively involved in updating Elementary Physics Experiments and Laboratory Manuals.
- New curriculum development for Master of Science in Physical Science (MSPS) program with Chemistry Department. The courses outline developed includes:
  1) PHYS 6231; Thin-Film Coating
  2) PHYS 6237; Applied Quantum Mechanics
  3) PHYS 6131; Physics of Solid State Materials
  4) PHYS 7330; Principles and Practice of Pre-clinical Drug Development

STUDENT EVALUATION OF TEACHING

Students' overall rating on instructor is 4.3/5.0 (average since 2006).

1) The instructor's preparation for this course (4.1/5.0)
2) The instructor's encouragement of class participation (4.0/5.0)
3) The organization of the course materials (4.0/5.0)
4) The clarity of the presentation of the course material (3.8/5.0)
5) The degree to which tests and other graded activities reflected course content (4.0/5.0)
6) The instructor's availability to students (4.1/5.0)
7) The instructor's helpfulness to students (4.2/5.0)
8) The degree to which the class stayed focused on course objectives (4.0/5.0)
9) The instructor's interest in the content of this course (4.4/5.0)
10) **OVERALL, HOW WOULD YOU RATE THIS INSTRUCTOR (4.3/5.0)**