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Education

1980	B. S. in Chemistry	University of Santo Tomas, Manila
1987	M. S. in Chemistry	University of Santo Tomas, Manila
1995	Ph. D. in Chemistry	University of Connecticut, Storrs

Employment Experience

1980 – 1987	Chemistry Instructor	University of Santo Tomas, Manila
1988 – 1994	Teaching/Research Asst.	University of Connecticut, Storrs, CT
1994 – 1996	Post-Doctoral Fellow	Brandeis University, Waltham, MA
1996 – 2001	Research Associate	University of Maryland Baltimore
2001 – 2006	Research Assistant Professor	University of Maryland Baltimore County
2004 – present	Assistant Director	UMBC Center for Advanced Sensor Technology
2006 – present	Research Associate Professor	University of Maryland Baltimore County

Memberships

American Chemical Society
American Association for the Advancement of Science
Philippine-American Academy of Science and Engineering, Member, Board of Directors
Biomedical Engineering Society
Network of Minority Research Investigators, Member, Oversight Committee

Awards

2003 – 2006: Principal Investigator, Mentored Quantitative Research Career Development Award (K25DK062990) from the National Institutes of Health - $388,000

2004-2007: Principal Investigator, Technologies for Metabolic Monitoring (W81XWH-04-1-0781) from the US Army Medical Research and Materiel Command - $299,850

2005-2010: Principal Investigator, Research Project Grant (R01DK072465-01) from the National Institutes of Health - $1,359,750

Patents/Disclosures

- Lakowicz, J. R., Tolosa, L., Eichhorn, L., Rao, G. (March 6, 2001) Engineered Proteins for Analyte Sensing, Patent No. US 6, 179,534 B1.
- Tolosa, L., Ge, X., Rao, G. (patent pending) Proteins, Sensors, and Methods of Characterizing Analytes Using the Same.
- L. Tolosa, G. Rao, I. Kostov, X. Ge (patent pending) Multianalyte Optical Sensing System Using Novel Proteins as Biosensing Elements.
- L. Tolosa, G. Rao, Y. Kostov, R. Badugu (disclosure) Minimally-invasive monitoring of the effectiveness of cancer chemotherapy.
- L. Tolosa, G. Rao, R. Badugu (disclosure) Modulation and detection of protein conformation with probes containing a photochemical switch.
- L. Tolosa, A. Bartolome, H. Lam (disclosure) Dicysteine binding protein mutants for site-selective fluorescence labeling and immobilization on chemically modified glass.
- L. Tolosa, H. Lam, Y. Kostov, G. Rao (patent application) Fluorophore Based Temperature Sensor

Journal Publications

1. Bartolome, A., Smalls-Mantey, L., Lin, D., Rao, G., Tolosa, L. "FRET-based glucose monitoring for bioprocessing", Genetically Engineered Probes for Biomedical Applications, Proc. of SPIE, 6098, 60980L-1 – 8, 2006.
2. Kostov, Y., Smith, D. S., Tolosa, L., Rao, G., Gryczynski, I., Gryczynski, Z., Malicka, J., Lakowicz, J. R. (2005) Directional Surface Plasmon-Coupled Emission from a 3 nm Green Fluorescent Protein Monolayer, Biotech. Prog., 21, 1731-1735.
3. Bartolome, A., Bardliving, C., Rao, G., Tolosa, L. (2005) Fatty acid sensor for low-cost lifetime-assisted ratiometric sensing using a fluorescent fatty acid binding protein, Anal. Biochem., 345, 133-139.
4. Ge, X., Tolosa, L. (corresponding author), Rao, G. (2004) Dual-labeled glucose binding protein for ratiometric measurements of glucose, Anal. Chem., 76, 1403-1410.
5. Ge, X., Tolosa, L., Simpson, J., Rao, G. (2003) Genetically engineered binding proteins as biosensors for fermentation and cell culture, Biotech. Bioeng., 84, 723-731.
6. Tolosa, L., Ge, X., Kostov, Y., Lakowicz, J. R., Rao, G. (2003) Dual-emitting biosensors for glucose and glutamine from genetically engineered E. coli binding proteins, Proc. SPIE Genetically Engineered and Optical Probes for Biomedical Applications, 4967, 19-25.
7. Kostov, Y., Tolosa, L., O'Connell, K., Anderson, P., Liu, Y., van Beek, N., Rao, G. (2003), Monitoring DsRed protein concentration in frozen insect larvae, Proc. SPIE Genetically Engineered and Optical Probes for Biomedical Applications, 4967, 100-107.
8. Tolosa, L., Ge, X., Rao, G., (2003) Reagentless optical sensing of glutamine using a dual-emitting glutamine-binding protein, Anal. Biochem., 314, 199-205.
9. Tolosa, L., Kostov, Y., Harms, P., Rao, G. (2002) Non-invasive measurement of dissolved oxygen in shake flasks, Biotech. Bioeng., 80, 594-597.
10. Murtaza, Z., Tolosa, L., Harms, P. and Lakowicz, J. R. (2002) On the Possibility of Glucose Sensing Using Boronic Acid and Luminescent Ruthenium Metal-Ligand Complex, J. Fluorescence, 12(2), 187-192.
11. Lakowicz, J.R., Gryczynski, I., Piszczek, G., Tolosa, L., Nair, R., Johnson, M.L., Nowaczyk, K. (2000) Microsecond dynamics of biological macromolecules, Methods in Enzymology, 23, 473-509.
12. Kumar, C. V., Tolosa, L. M., (1999) Exploring the hydrophobic binding sites of calmodulin with fluorescent probes: Dynamic formation of the excimer, Indian Journal of Chemistry, 38B, 1170-1183.
13. Lakowicz, J. R., Gryczynski, I., Gryczynski, Z., Tolosa, L., Dattelbaum, J. D., Castellano, F. N., Abugo, O. (1999) Emerging Fluorescence Technologies in Clinical Chemistry, Clinical Chemistry, Proceedings of the Oak Ridge Conference on the Road to Non-Invasive Testing.
14. Lakowicz, J. R., Gryczynski, I., Dattelbaum, J.D., Tolosa, L., Rao, G. (1999) Novel Methods of Fluorescence Sensing, SPIE Conference on Advances in Fluorescence Sensing Technology IV, 3602, 234-240.
15. Tolosa, L., Gryczynski, I. Randers-Eichhorn, L., Dattelbaum, J.D., Rao, G. and Lakowicz, J. R. (1999) Glucose Sensing, SPIE Conference on Advances in Fluorescence Sensing Technology IV, 3602, 46-51.
16. Lakowicz, JR, Gryczynski I., Gryczynski Z., Tolosa, L. Dattelbaum, J. D.,and Rao, G. (1999) Polarization-Based Sensing with a Self-Referenced Sample, Applied Spectroscopy, 53(9), 1149-1157.
17. Lakowicz, JR, Gryczynski I., Gryczynski Z., Tolosa, L. Randers-Eichorn, L.,and Rao, G. (1999) Polarization- Based Sensing of Glucose Using an Oriented Reference Film, Journal of Biomedical Optics, 4(4), 443-449.
18. Tolosa, L., Gryczynski, I., Eichorn, L., Dattelbaum, J., Castellano, F. N., Rao, G. and Lakowicz, J. R.,(1999) Glucose Sensor for Low Cost Lifetime-Based Sensing Using a Genetically Engineered Protein, Anal. Biochem., 267(1), 114-120.
19. Lakowicz, JR, Gryczynski, I., Tolosa, L., Dattelbaum, J. D., Castellano, F. N., Li, L. and Rao, G. (1999) Advances in Fluorescence Spectroscopy: Multi-Photon Excitation, Engineered Proteins, Modulation Sensing and Microsecond Rhenium Metal-Ligand Complexes, Proceedings of the Jablonski Conference, Acta Physica Polonica 99(1), 179-196.
20. Lakowicz, JR, Castellano, F. N., Dattelbaum, J. D., Tolosa, L.,Rao, G.and Gryczynski, I (1998) Low Frequency Modulation Sensors Using Nanosecond Fluorophores, Anal. Chem., 70, 5115-5121.
21. Tolosa, L. M., Malak, H., Rao, G. and Lakowicz, J. R., (1997) Optical Assay for Glucose Based on the Luminescence Decay Time of the Long Wavelength Dye Cy5^{TM} , Sensors and Actuators B, 45, 93-99.
22. Tolosa, L. M., Szmacinski, H., Rao, G. and Lakowicz, J. R. (1997) Lifetime-based Sensing of Glucose Using Energy Transfer with a Long Lifetime Donor, Analytical Biochemistry, 250, 102-108.
23. Kumar, C. V. and Tolosa, L. M. (1994) 2,6-Bis(pyren-1-oyl)pyridine: A new Fluorescent Probe with a High Sensitivity to Hydrogen Bonding Solvents for the Development of Selective Sensors, J. Photochem. And Photobiol. A: Chem. Sec., 78, 63-69.
24. Kumar, C. V. and Tolosa, L. M. (1993) Interaction of Hydrophobic Probes with Serum Albumin - Influence of the Side Chain and Exciplex Formation at the Binding Site, J. Phys. Chem., 97, 13914-13919.
25. Tolosa, L. M. and Kumar, C. V. (1993) The Role of the Side Chain, Charge, and Hydrophobicity on the Protein Binding Affinity of Simple Fluorescent Molecules, FASEB J., 7(7), A1131.

26. Kumar, C. V. and Tolosa, L. M. (1993) New Charge Transfer Probe for Solvent Polarity: Fluorescent Hydrogen Bonding Switch, Chem. Comm., 722.
27. Radia, S. M., Kumar, C. V. and Tolosa, L. M. (1992) A New Approach for the Design of Sequence Specific Fluorescent Probes for DNA, Proceedings - National Conference for Undergraduate Research VI, 1796-1800.
28. Tolosa, L. M. and Sevilla, F. B. (1987) Copper and Zinc in Hair Samples from Filipinos with Pulmonary Tuberculosis, Acta Manilana, 36, 51-57.

Book Chapters

- L. Tolosa, K. Nowaczyk, J. R. Lakowicz, Fluorescence Probes for Biochemical Systems in An Introduction to Laser Spectroscopy, 2nd edition (2002), pp. 139 – 171, D. L. Andrews and A. A. Demidov, eds., Plenum Publishing Corp.
- L. Tolosa, Y. Kostov, G. Rao, Fluorescence Based Sensing for Bioprocess Monitoring, in Fluorescence Sensors and Biosensors (2005), R. Thompson, ed., Marcel Dekker Publishers.
- L. Tolosa, G. Rao, Binding Proteins as Glucose Sensors, in Glucose Sensing, Topics in Fluorescence Spectroscopy, Vol. 11, (2006) C. Geddes and J. R. Lakowicz, eds., Springer-Verlag.

Presentations

- L. Tolosa (Invited Talk) Biosensing at the UMBC Center for Advanced Sensor Technology, Spectrx, Inc., November 2, 2006, Norcross, GA.
- L. Tolosa (Invited Talk) From the Winged Monster to Diabetes, University of Connecticut, Celebrating the Elements of Connecticut Chemistry, September 29, 2006, Storrs, CT.
- L. Tolosa (Oral Presentation) A low-cost reagentless multianalyte metabolic monitor, The 9th World Congress on Biosensors, May 10 – 12, 2006, Toronto, Canada.
- L. Tolosa (Invited Talk) A Low-Cost Multi-Metabolite Monitor for Diabetes Care, Biomedical Engineering & Institute for Micromanufacturing, Louisiana Tech. University, May 1, 2006, Ruston, LA.
- L. Tolosa (Poster) Designer Protein Biosensors for Low-Cost, Point-of-Care Diagnostics, Network of Minority Research Investigators Workshop, April 20 – 21, 2006, Bethesda, MD.
- A. Bartolome, D. Lin, G. Rao and L. Tolosa (Poster) Fluorescence detection of glucose based on glucose binding protein immobilized on dextran modified glass capillary, Pittsburgh Conference, March 12-17, 2006, Orlando, FL.
- A. Bartolome, Y. Kostov, G. Rao and L. Tolosa (Poster) Designer Protein Biosensors for Low-Cost, Point-of-Care Diagnostics, Gordon Research Conference on Bioanalytical Sensors, February 26 – March 3, 2006, Ventura, CA.
- A. Bartolome, L. Smalls-Mantey, D. Lin, G.Rao and L.Tolosa (Poster) FRET-based glucose monitoring for bioprocessing, SPIE Photonics West, January 21 – 26, 2006, San Jose, CA
- L. Tolosa, A. Bartolome, C. Bardliving (Poster) Improved Ratiometric Sensing of Fatty Acids, 5th Diabetes Technology Meeting, November 10-12, 2005, San Francisco, CA.
- L. Tolosa (Poster) Binding Proteins for Low-Cost Metabolite Sensing, The Gordon Research Conference on Chemical Sensors and Interfacial Design, August 28 – September 2, 2005, Oxford, UK.
- L. Tolosa (Invited Talk) Practical Fluorescence, University of San Carlos – PAASE Tutorials, June 27, 2005, Cebu, Philippines.
- L. Tolosa (Invited Talk), A Low-Cost Reagentless Multi-Analyte Metabolic Monitor, Philippine-American Academy of Science and Engineering Annual Meeting, June 24 – 25, 2005, Cebu, Philippines.
- L. Tolosa (Invited Talk), Biosensor Design for Point-of-Care Diagnostics, University of Santo Tomas - PAASE Symposium, June 22, 2005, Manila, Philippines.
- L. Tolosa (Poster), A. Bartolome, Y. Kostov, G. Rao, A Low-Cost Reagentless Multi-Analyte Metabolic Monitor, Pittsburgh Conference, February 26 – March 4, 2005, Orlando, FL.
- L. Tolosa (Poster), G. Rao,Y. Kostov, Development of a Reagentless Multi-Analyte Metabolic Monitor, Biomedical Engineering Society Meeting, October 13-16, 2004, Philadelphia, PA.
- L. Tolosa (Poster), Y. Kostov, X. Ge, B. Gonzales, A. Bartolome, G. Rao, Design of a Multi-Metabolite Monitor Using Novel Reagentless Biosensors, 4th Annual Diabetes Technology Meeting, October 29-30, 2004, Philadelphia, PA.
- G. Rao, Y. Kostov, L. Tolosa, X. Ge, P. Harms, M. Das, Novel Optical Sensors for High Throughput Culture, Cell Culture Engineering IX, March 7-12, 2004, Cancun, Mexico.

- L. Tolosa (Oral), X. Ge, Y. Kostov, G. Rao, Dual-Emitting biosensors for glucose and glutamine from genetically engineered E. coli binding proteins, Photonics West, January 25-31, 2003, San Jose, CA.
- L. Tolosa (Oral), X. Ge,Y. Kostov, G. Rao, A dual-emitting glucose binding protein for low-cost monitoring of glucose, Pittsburgh Conference, March 9-14, 2003, Orlando, FL.
- L. Tolosa (Invited Talk) Development of Novel Glucose Sensors from an ATP-Binding Cassette (ABC) Transporter System, "New Frontiers in Science and Technology", University of the Philippines, July 8, 2003, Quezon City, Philippines.
- L. Tolosa (Oral) Applications of Luminescent Metal Ligand Complexes in Sensing, Philippine-American Academy of Science and Engineering Meeting, July 11-12, 2003, Manila, Philippines.
- L. Tolosa (Invited Talk), Novel Glucose Sensors from ABC Transporter Proteins University of Santo Tomas, July 22, 2003, Manila, Philippines.
- L. Tolosa, (Invited Talk) X. Ge, G. Rao, Extremely Sensitive Glucose Binding Protein-based Sensor as an Alternative to Glucose Oxidase, Biomedical Engineering Society Meeting, October 1-4, 2003 Nashville, TN.
- L. Tolosa (Poster), X. Ge, G. Rao, Novel Biosensors for Glucose and the Stress Metabolite, Glutamine Derived from ATP-Binding Cassette (ABC) Transporter Proteins, Diabetes Technology Society Meeting, , November 6-9, 2003, San Francisco, CA.
- Tolosa, L. M., Szmacinski, H., Rao, G. and Lakowicz, J. R., Lifetime-Based Sensing of Glucose Using Energy Transfer with a Long-Lifetime Metal-Ligand Donor, Optical Society of America Annual Meeting, October, 1997, Long Beach, CA.
- Tolosa, L. M. and C. V. Kumar, Structure-Protein Binding Affinity Relationships of Simple Fluorophores, 23rd Northeast Regional Meeting of the American Chemical Society, June, 1993, Boston, MA.
- Tolosa, L. M. and C. V. Kumar, The Role of the Side-Chain, Charge and Hydrophobicity on the Protein Binding Affinity of Simple Fluorescent Molecules, Joint Meeting of the American Society for Biochemistry and Molecular Biology and the Division of Biological Chemistry — American Chemical Society, May-June, 1993, San Diego, CA.
- Tolosa, L. M. and C. V. Kumar, Novel Bichromophoric Probes for Proteins and the Influence of the Protein Matrix on the Photoreactions of Probe, Inter-American Photochemical Society 5th Winter Conference, January 1993, Clearwater Beach, FL.
- Tolosa, L. M., Novel Bichromophoric Probes to Study Protein Structure, 22nd Northeast Regional Meeting of the American Chemical Society, June 1992, Syracuse, NY.
- Tolosa, L. M. and C. V. Kumar, New Bifunctional Probes for the Study of Protein Structure (third prize, student poster session), R. T. Major Lecture Series, October, 1992, Storrs, CT.
- Tolosa, L. M. and C. V. Kumar, Novel bichromophoric Probes for Protein Structure (second prize, student poster session), R. T. Major Lecture Series, April, 1992, Storrs, CT.
- Tolosa, L. M. and C. V. Kumar, Twisted Intramolecular Charge-Transfer Probes for Protein Side Chains (third prize, student poster session), R. T. Major Lecture Series, April, 1989, Storrs, CT.

Current and Previous Support

Principal Investigator - Grant # DK062990 (2003-2006): This is a 3-year plus one-year no-cost extension NIH K25 grant under the mentorship of Dr. Govind Rao. This project seeks to develop a glucose sensor based on the E. coli glucose ABC (ATP-binding cassette) transporter. The objective of this study is to explore the potential of groups of proteins as sensors rather than the traditional single proteins. [$388,000]

Principal Investigator - Award # W81XWH-04-1-0781 (2004-2006): This is a project funded by the US Army on a low-cost portable system for multi-analyte metabolic monitoring. This system is based on optical sensing of glucose, glutamine and lactate using a disposable cassette with wells containing lyophilized fluorescent binding proteins and a buffer reservoir. The main goal is to assess stress levels of military personnel in the field, but the device is applicable to other conditions such as diabetes monitoring. [$299,850]

Principal Investigator – RO1 DK072465 (2005-2010): This project is for an optical device for minimally invasive, continuous monitoring of glucose, glutamine and lactate. Improvements over the disposable sensor are incorporated such as immobilization of the binding proteins, focusing strategies, and redundant measurements. [$1,359,750]

Mentor/Advisor for Lauren Smalls-Mantey – R01 DK072465-01S1 (2006 – 2007): Research Supplement to Promote Diversity in Health-related Research for Ms. Smalls-Mantey. The grant is support of Ms. Smalls-Mantey for two summers. [$15,915]

Principal Investigator – Unrestricted Gift from Becton-Dickinson Technologies for the support of one post-doctoral fellow. [$30,000]

Synergistic Activities

- Participant in Scientific Review Panels for the National Institute of Diabetes and Digestive and Kidney Diseases: Develop new therapies for Type 1 diabetes and its complications (ZDK1 GRB-2, July 30, 2004) and Small Business Bioengineering and Physiology (ZRG1 SSMI-K, March 13 – 14, 2006).
- Participant in the Scientific Review Panel for the US Army Research and Materiel Command: Technologies in Metabolic Monitoring (April 10 – 12, 2005).
- Initiated collaborations between the UMBC Center for Advanced Sensor Technology and the UM Greenebaum Cancer Center, UMBC Center for Advanced Studies in Photonics Research, US Department of Agriculture, Spectrx, Inc., and the Sensor Group of the University of Santo Tomas, Manila.
- An active member of the Philippine-American Academy of Science and Engineering, served as Secretary from 2000 – 2005 and as Member of the Board of Directors from 2006 – 2008. I was a major participant in organizing the PAASE annual meetings from 2001 to 2005 both here in the US and in the Philippines.
- An active reviewer of manuscripts submitted to leading scientific journals and grant proposals submitted to agencies such as the Maryland Industrial Partnerships.

Thesis and Postdoctoral Advisor

- Thesis Advisor: Dr. Challa Vijaya Kumar, Department of Chemistry, University of Connecticut, Storrs, CT
- Postdoctoral Advisor: Dr. Saul G. Cohen (retired), Department of Chemistry, Brandeis University, Waltham, MA

Postdoctoral Advisees

Dr. Amelita Bartolome (October 1, 2004 – July 30, 2006)
Dr. Hung Lam (February 10, 2006 to present)

References

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