

FRANCISCO MAYA, Ph.D.

Rice University Center for Nanoscale
Science and Technology MS-222
P.O. Box 1892 Houston Texas 77251
☎ 713 3486249 ✉ itzamna at fmaya.com

more information at: <http://fmaya.com>

OBJECTIVE

An opportunity to exploit my skills and experience to solve scientific problems, providing solutions and alternative actions through research and development

HIGHLIGHTS of SKILLS

- Broad range of training across several scientific disciplines: organic chemistry, organometallics, polymer chemistry, catalysis, surface chemistry, materials sciences, chemical engineering and computational chemistry
- Five years of productive experience in a fast-paced, results-oriented laboratory
- Ability to work independently and in a team, goal-oriented environment
- Native in Spanish, fluent in English, good understanding of French

EDUCATION

- 2000-2004 •Ph.D. in Organic Chemistry, Rice University, Houston, TX, Advisor: Prof. James M. Tour, Thesis: "Synthesis and Analysis at the Chemical Interface of Novel Oligomers as Candidates for Molecular Electronics"
- 1996-1998 •M.S. in Organic Chemistry, National Polytechnique Institute (IPN), México City, México, Advisor: Prof. Hugo A. Jiménez-Vázquez, Thesis: "Minima Characterization on the Potential Energy Surface for Noble Gas Clusters"
- 1991-1996 •B.S. in Chemical Engineering, Celaya Institute of Technology (ITC), Celaya, GTO, México

PROFESSIONAL EXPERIENCE

- 2004-present •LTD-Patterning Process Engineer, Intel Co.
- Graduate Research Assistant, Rice University, Advisor: Prof. James Tour
 - Designed and synthesized oligomers as potential molecular devices: aliphatic, aromatic and conjugated organic molecules to be incorporated in new microelectronic architectures based on metallic, carbon and semiconductor surfaces
 - Prepared, functionalized and analysed carbon nanotubes and derivatives
 - Mastered techniques of organic and organometallic synthesis and functionalization of small aromatic molecules
 - Developed skills in surface chemistry and analysis at the chemical interface
 - Gained experience in electronic nanostructures manipulation, molecular functionalization and electrical testing
 - Used computational modeling and calculations at different levels: molecular mechanics, ab initio and density functional theory
 - Maintained operational responsibility for the solvent stills, oxidation equipment and chemical inventory
- 2003-2004 •Consulting, "Sensory and Human Olfactory Research", Client: Dr. Denise Chen, Department of Psychology, Rice University
- Prepared reagents and experiments for the human detection of different substances, analyzed by chromatography and spectroscopy
- 2000-2002 •Graduate Teaching Assistant, Rice University
- Supervised and graded general and organic chemistry labs for undergraduates
- May 2000 •NSF-AGEP Intern, Rice University
- Gained experience in the synthesis of precursors for cyclophanes and other macromolecular structures

- 1998-2000 •Research Assistant, Yale University, Advisors: Prof. James R. Cross and Prof. Martin Saunders
 -Synthesized, prepared, derivatized and characterized fullerenic materials
 -Gained experience in high-pressure, high-temperature experiments and equipment for the synthesis of endohedral fullerenes
- 1996-1998 •Graduate Research Assistant, National Polytechnique Institute (IPN), México City, México, Advisor: Prof. Hugo A. Jiménez-Vázquez
 -Purified and functionalized fullerenic materials
 -Synthesized small heterocyclic compounds for C-C bonding with fullerenes via Diels-Alder cycloadditions
 -Designed computational algorithms for Monte Carlo and molecular mechanics computational methods applied on simulation of chemical interactions between homogeneous atomic nanoclusters
- 1995-1996 •Technical Assistant, Biotechnology Lab, ITA-33, México, Advisor: M.S. Luis F. Flores

INSTRUMENTAL AND COMPUTER SKILLS

- Chromatography: high performance liquid, gel permeation, gas, flash, preparative thin layer
- Spectroscopy: X-ray photoelectron, Raman, FT-IR, surface IR, UV-Vis, multiprobe NMR, mass
- Sample preparation: self-assembled monolayers and grafting on metallic, semiconductor and carbon surfaces
- Microscopy: scanning probe, Kelvin probe
- Computer: chemical modeling and analysis, Windows and Unix-based office and graphics software, web publishing and administration, programming in FORTRAN, C, HTML and Java
- Other techniques: metal evaporation, shadow mask photolithography, ellipsometry, goniometry, differential scanning calorimetry, thermogravimetric analysis, cyclic voltammetry, semiconductor parametric analyzer and probe station; Schlenk line and glove box operation

PROFESSIONAL AFFILIATIONS

- American Chemical Society member
- Materials Research Society member

PRESENTATIONS AND AWARDS

- 2004 •Poster presentation: "Direct Covalent Bonding of Molecular Wires on Si, Pd, GaAs, and Carbon Nanotubes" Texas Surface Science Roundup, Roundtop, Texas; May
- 2003 •Talk presentation: "Progres Recents dans L'Electronique Moleculaire" CNRS Paris, France; Decembre
- 2003 •Talk presentation: "Avances Recientes en Electronica Molecular" Deptos Ing. Química, Bioquímica y Electrónica, ITC, Celaya GTO México; Noviembre
- 2003 •Talk presentation: "Avances Recientes en Electronica Molecular" Lic. Informática, ITA No. 33, Roque GTO México; Noviembre
- 2003 •Talk presentation: "Organic Functionalization of Bulk Solid Surfaces" 226th ACS National Meeting New York City; September
- 2003 •Poster presentation: "Assembly of Molecular Wires on Si, Pd and GaAs and their Device Properties" DARPA Review Meeting, Mclean, Virginia; July
- 2003 •Talk presentation: "Synthesis and Assembly of Moleware on Silicon Surfaces" 2003 DARPA Regional Meeting, Rice University, Houston, Texas; April
- 2003 •Talk presentation: "The Synthetic Side of Moletronics" DARPA Regional Meeting, Rice University, Houston, Texas; April
- 2001 •Poster presentation: "Synthesis of New Dinitro Oligomers as Potential Molecular Electronics Devices", RQI, Rice University, Houston, Texas; September
- 2000 •NSF Summer AGEP Program Award for Research, Rice University

PATENTS AND PUBLICATIONS

13. Moore, A. M.; Dameron, A. A.; Mantooth, B. A.; Smith, R. K.; Fuch, D. J.; Ciszek, J. W.; Maya, F.; Yao, Y.; Tour, J. M.; Weiss, P. S. "Molecular Engineering and Measurements to Test Hypothesized mechanisms in Single Molecule Conductance Switching", *J. Am. Chem. Soc.* **2006**, ASAP Article.
12. Lewis, P. A.; Inman, C. E.; Maya, F.; Tour, J. M.; Hutchison, J. E.; Weiss, P. S., "Molecular Engineering of the Polarity and Interactions of Molecular Electronic Switches," *J. Am. Chem. Soc.* **2005**, *127*, 17421
11. Maya, F. *et al.*, **2004** "Preparation of Individual Single-Walled Carbon Nanotubes as a Scanning Probe Microscopy Tips" *Patent accepted*
10. Moore, A. M.; Mantooth, B. A.; Donhauser, Z. J.; Maya, F.; Price, D. W. Jr., Yao, Y.; Tour, J. M.; Weiss, P. S. "Cross-Step Place Exchange of Oligo(Phenylene-Ethynylene) Molecules," *Nano Lett.* **2005**, *5*, 2292
9. Maya, F. *et al.*, **2004** "Covalent Attachment of Single-Walled Carbon Nanotubes to Silicon Surfaces" *Patent accepted*
8. Maya, F.; Flatt, A. K.; Stewart, M. P.; Shen, D. E.; Tour, J. M. "Formation and Analysis of Self-Assembled Monolayers from U-Shaped Oligo(phenylene ethynylene)s as Candidates for Molecular Electronics" *Chem. Mater.*, **2004**, *16*, 2987
7. Maya, F.; Chanteau S. H.; Cheng, L.; Stewart, M. P.; Tour, J. M. "Synthesis of Fluorinated Oligomers toward Physical Vapor Deposition Molecular Electronics Candidates" *Chem. Mater.*, **2005**, *17*, 1331
6. Cheng, L.; Stewart, M. P.; Maya, F.; Kosynkin, D. V.; Dirk, S. M.; He, J.; Hong, Z.; Stapleton, J. J.; McGuinness, C. L.; Nackashi, D. P.; Yao, Y.; Flatt, A. K.; St. Angelo, S. K.; Allara, D. L.; Mallouk, T. E.; Franzon, P. D.; Tour, J. M. "Molecular Electronics" NanoCell Electronic Memories and Direct Covalent Attachment of Molecules to Oxide-Free Silicon for Construction of Hybrid Devices" *Science Technica* **2004** 199
5. Dyke, C. A.; Stewart, M. P.; Maya, F.; Tour, J. M. "Diazonium-Based Functionalization of Carbon Nanotubes: XPS and GC-MS Analysis and mechanistic Implications" *SynLett*, **2004**, *1*, 155
4. Flatt, A. K.; Yao, Y.; Maya, F.; Tour, J. M. "Orthogonally Functionalized Oligomers for Controlled Self-Assembly" *J. Org. Chem.*, **2004**, *69*, 1752
3. Stewart, M. P.; Maya, F.; Kosynkin, D. V.; Dirk, S. M.; Stapleton, J. J.; McGuinness, C. L.; Allara, D. L.; Tour, J.M. "Direct Covalent Grafting of Conjugated Molecules onto Si, GaAs, and Pd Surfaces from Aryldiazonium Salts" *J. Am. Chem. Soc.*, **2004**, *126*, 370
2. Maya, F. Tour, J. M. "Synthesis of Terphenyl Oligomers as Molecular Electronic Device Candidates" *Tetrahedron* **2004**, *60*, 81
1. Price, D. W. Jr; Dirk, S. M.; Maya, F.; Tour, J. M. "Improved and New Syntheses of Potential Molecular Electronic Devices" *Tetrahedron* **2003**, *59*, 2497