

MARÍA ALEJANDRA GÓMEZ-TORRES

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PROFESSIONAL PROFILE

Chemical engineer and chemistry PhD. I am an experienced chemistry and material science researcher who has over ten years of experience working in chemical laboratories and manipulating various instruments for physical and chemical analysis of materials both in national and international environments. In addition, I have experience teaching various research-based topics and chemistry courses at the college level, coordinating research projects, and training students and researchers. I communicate, teach, and produce scientific material with high proficiency in English and Spanish. Currently, I am interested in using my skills to help face challenges in industry or in academia through the implementation of innovative ideas, taking advantage of my engineering profile that is complemented by years of research and teaching work.

EMPLOYMENT AND RESEARCH EXPERIENCE

01/2025 – present

Postdoctoral Research Associate • Department of Chemistry • The University of Texas at El Paso – USA

Research project development and coordination – synthesis and study of actinide-based complexes.

Prepare supplemental funding requests and progress reports.

Collaborate with internal and external partners to achieve project objectives.

Laboratory resources administration.

Graduate student training.

01/2024 – 12/2024

Associate/Adjunct Professor • Manuela Beltrán University – Colombia

General chemistry and organic chemistry professor - non-majors including biomedical engineering, nursing, and speech-language pathology students.

09/2022 – 11/2023

Postdoctoral Scholar • International Institute of Nanotechnology • Northwestern University – USA

Development of actinide-based complexes and metal-organic frameworks. Research project development and coordination.

Actively liaised with internal and external collaborators to satisfy all project objectives.

Laboratory resources administration, and instrumentation maintenance.

06/2017 – 08/2022

Research Assistant and Teaching Assistant • Department of Chemistry • The University of Texas at El Paso - USA

Synthesis, characterization, and reactivity studies of early transition metal-based complexes.

Synthesis and characterization of endohedral metallofullerenes.

Student training and collaborative research work.

Research project development and coordination.

01/2017 – 05/2017

University of Texas at El Paso English Language Institute (ELI) student.

08/2015 – 01/2016

Undergraduate Intern • École Nationale Supérieure de Chimie de Lille-ENSCL, Université de Lille – France

Characterization of rare earth phosphates, borates, and vanadates and study of their luminescent properties.

01/2015 – 07/2015

Undergraduate Research Assistant • Department of Chemical Engineering, INTERFASE research group • Universidad Industrial de Santander – Colombia

Synthesis and characterization of rare earth phosphates, borates, and vanadates.

EDUCATION

Ph.D. in Chemistry

06/2017 – 08/2022

The University of Texas at El Paso – USA

GPA – 3.96/4.00

B.S. Chemical Engineering

03/2011 – 06/2016

Industrial University of Santander – Colombia

Cum Laude

LANGUAGE SKILLS

- Native Spanish speaker
- Fluent in English

SOFT SKILLS

- Leadership
- Dynamism and proactivity
- Multitasking
- Analytical reasoning
- Problem solving and resourcefulness

CONFERENCE PRESENTATIONS AND WORKSHOPS

- GRC Organometallic Chemistry Conference – Salve Regina University, Newport, RI, 07/2025
- 30TH Rare Earth Research Conference – Argonne National Laboratory – IL, 06/2025
- ACS Spring 2022 meeting – Bonding Through Chemistry, San Diego - CA, 03/2022
- ACS SWRM/RMRM meeting, El Paso - TX, 11/2019
- 233rd Electrochemical Society (ECS) meeting, Seattle – WA, 05/2018

HOBBIES AND INTERESTS

Scientific dissemination activities (Saturday Science Spree (SASS) outreach, graduate student-directed seminar series committee) and volunteering activities (Project MOVE, UTEP).

Environmental and social activism.

Reading, learning languages, cooking, and jogging.

SKILLS AND ABILITIES

Synthetic Inorganic Chemistry

- Synthesis and reduction/oxidation chemistry of air/moisture sensitive complexes of titanium, uranium, scandium, and iron using glovebox and Schlenk techniques.
- Reactivity studies of low-valent titanium synthons and uranium compounds.
- Hydrogenation catalysis.
- Characterization of air/moisture sensitive materials using single-crystal and powder X-Ray Diffraction (sc-, p-XRD), Nuclear Magnetic Resonance (NMR), Infrared (IR), and UV-vis-NIR spectroscopies, Superconducting Quantum Interference Device (SQUID) magnetometry, and Electron Paramagnetic Resonance (EPR) spectroscopy.

Metal Organic Frameworks

- Synthesis of uranium-containing Metal Organic Frameworks (MOFs) for small molecule binding and activation.
- Material characterization and reactivity studies using powder X-Ray Diffraction (p-XRD), gas sorption measurements, Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES), Thermogravimetric Analysis (TGA), Scanning Electron Microscopy (SEM), X-ray Photoelectron Spectroscopy (XPS), and Variable-Temperature Diffuse Reflectance Infrared Fourier Transform Spectroscopy (VT-DRIFTS).

X-ray Diffraction Studies

- Single-crystal data collection, structure solution and refinement on air/moisture sensitive compounds.
- Spring 2019: "Applications of Synchrotron and Electron Techniques", Brookhaven's online course.
- Fall 2019, Spring 2022: XANES-EXAFS data collection and processing on air/moisture sensitive uranium-containing samples, Advanced Photon Source, Argonne National Laboratory.
- Summer 2022: ACA Summer Course in Chemical Crystallography.

Plasma Arc Synthesis of Endohedral Fullerenes

- Synthesis of uranium and scandium endohedral fullerenes using arc-discharge techniques.
- Identification and purification of micro-gram quantities of material using MALDI-TOF mass spectrometry, and multi-step High Performance Liquid Chromatography (HPLC).

Solid State Chemistry

- Synthesis of specific phases of rare-earth doped inorganic materials using ceramic methods.
- Material characterization, phase identification, and luminescence studies using powder X-Ray Diffraction (p-XRD), UV-vis Diffuse Reflectance Spectroscopy (DRS), and fluorescence spectroscopy.

- Pathways to the Workforce workshop, University of California Santa Barbara – CA, 08/2019.

SCHOLARSHIPS

- Anita Mochen Loya Fellowship, University of Texas at El Paso - USA (2017)
- Research assistantship, University of Texas at El Paso - USA (2017, 2018, 2022)
- Research assistantship, École Nationale Supérieure de Chimie de Lille – France (2015)
- Research assistantship and academic assistantship, Industrial University of Santander - Colombia (2013 - 2015)

REFERENCES

Skye Fortier, PhD
Associate Professor
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The University of Texas at El Paso, USA
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Omar Farha, PhD
Charles E. and Emma H. Morrison Professorship in Chemistry
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PUBLICATIONS

Alejandra Gómez-Torres: <https://orcid.org/0000-0002-2663-0807>

1. **GÓMEZ-TORRES A.**, PARVEEN R., MURILLO J., MAVRAGANI N., MACGREGOR F., W. OEHLSEN O., TARULA-MARIN J. L., WRIGHT J., MA L., METTA-MAGANA A., MURUGESU M., VLAISAVLJEVICH. B.,* AND FORTIER S.* HOMOLEPTIC URANIUM ARENOCENES: A NEW CLASS OF ACTINIDE SANDWICH COMPOUNDS. *SUBMITTED TO JACS*.
2. OEHLSEN O., MACGREGOR F., JONES M. J. F., GÓMEZ-TORRES A., MOREAU L. M., WRIGHT J., MA L., AND FORTIER S.* A SIMPLE AND PRACTICAL WAX-ENCAPSULATION METHOD FOR AIR-SENSITIVE XAS SAMPLES. *INORG. CHEM. FRONT.*, 2026, 13, 12-19.
3. KIRLIKOVALI K.*†, **GÓMEZ-TORRES A.**† SAUZA-DE LA VEGA A., DARÙ A., KRZYANIAK M. D., WASIELEWSKI M. R., GAGLIARDI L.,* AND FARHA O. K.* ELECTRONICALLY TUNABLE LOW-VALENT URANIUM METALLACARBORANES. *INORG. CHEM.*, 2025, 64, 10, 4749–4760.
4. LEE S., XIE H., CHEN Z., RASEL MIAN M., **GÓMEZ-TORRES A.**, SYED Z. H., REISCHAUSER S., CHAPMAN K. W., DELFERRO M.,* FARHA, O. K.* METAL–ORGANIC FRAMEWORKS AS A TUNABLE PLATFORM TO DECONVOLUTE STEREOELECTRONIC EFFECTS ON CATALYTIC ACTIVITY IN THIOANISOLE OXIDATION. *J. AM. CHEM. SOC.* 2024, 146, 6, 3955–3962.
5. **GOMEZ-TORRES A.**, METTA-MAGANA A., AND FORTIER S.* SYNTHESIS OF AN ARENIDE SCANDIUM COMPLEX ACCOMPANIED BY REDUCTIVELY INDUCED C-H ACTIVATION. *ORGANOMETALLICS* 2022, 41, 21, 2891–2896.
6. **GOMEZ-TORRES A.**, MAVRAGANI N., METTA-MAGANA A., MURUGESU M., AND FORTIER S.* MOLECULAR CAPACITORS: ACCESSIBLE 6- AND 8-ELECTRON REDOX CHEMISTRY FROM DIMERIC “Ti(I)” AND “Ti(O)” SYNTHONS SUPPORTED BY IMIDAZOLIN-2-IMINATO LIGANDS. *INORG. CHEM.* 2022, 61, 16856–16873.
7. MURILLO J., BHOWMICK R., HARRIMAN K. L. M., **GOMEZ-TORRES A.**, WRIGHT J., MIRO P., METTA-MAGANA A., MURUGESU M., VLAISAVLJEVICH B.,* AND FORTIER S.* ACTINIDE ARENE-METALATE: 2. A NEUTRAL URANIUM BIS(ANTHRACENIDE) COMPLEX AND ELUCIDATION OF ITS ELECTRONIC STRUCTURE. *CHEM. COMMUN.* 2022, 58, 9112-9115.
8. MURILLO J., BHOWMICK R., HARRIMAN K. L. M., **GÓMEZ-TORRES A.**, WRIGHT J., MEULENBERG R. W., MIRÓ P., METTA-MAGANA A., MURUGESU M., VLAISAVLJEVICH B.,* AND FORTIER S.* ACTINIDE ARENE-METALATES: ION PAIRING EFFECTS ON THE ELECTRONIC STRUCTURE OF UNSUPPORTED URANIUM–ARENIDE SANDWICH COMPLEXES. *CHEM. SCI.*, 2021, 12, 13360-13372.
9. **GÓMEZ-TORRES A.**, AND FORTIER S.* REDOX CHEMISTRY OF DISCRETE LOW VALENT TITANIUM COMPLEXES AND LOW VALENT TITANIUM SYNTHONS. *CHEM. COMMUN.* 2021, 57, 10292-10316.
10. STAUN S. L., KENT G. T., **GÓMEZ-TORRES A.**, WU G., FORTIER S., AND HAYTON T. W.* REDUCTIVE COUPLING OF XYLYL ISOCYANIDE MEDIATED BY LOW-VALENT URANIUM. *ORGANOMETALLICS* 2021, 40, 2934–2938.
11. VISHNOI P., ZUO J. L., COOLEY J. A., KAUTZSCH L., **GÓMEZ-TORRES A.**, MURILLO J., FORTIER S., WILSON S. D., SESHADRI R.,* AND CHEETHAM A. K.* CHEMICAL CONTROL OF SPIN-ORBIT COUPLING AND CHARGE TRANSFER IN VACANCY-ORDERED RU(IV) HALIDE PEROVSKITES. *ANGEW. CHEM. INT. ED.* 2021, 60, 5184-5188.
12. **GÓMEZ-TORRES A.**, GAUTHIER G. H., KACZMAREK A. M., HUVÉ M., ROUSSEL P., DUPRAY V., YUAN L., ZADOYA A., AND COLMONT M.* PURE AND RE³⁺-DOPED LA₇O₆(VO₄)₃ (RE = Eu, Sm): POLYMORPHISM STABILITY AND LUMINESCENCE PROPERTIES OF A NEW OXYVANADATE MATRIX. *INORG. CHEM.* 2020, 59, 5929-5938.
13. **GÓMEZ-TORRES A.**, AGUILAR-CALDERÓN J. R., SAUCEDO C., JORDAN A., METTA-MAGANA A., PINTER B.,* AND FORTIER S.* REVERSIBLE OXIDATIVE-ADDITION AND REDUCTIVE-ELIMINATION OF THIOPHENE FROM A TITANIUM COMPLEX AND ITS THERMALLY-INDUCED HYDRODESULPHURIZATION CHEMISTRY. *CHEM. COMMUN.* 2020, 56, 1545-1548.
14. AGUILAR-CALDERÓN J. R., MURILLO J., **GÓMEZ-TORRES A.**, SAUCEDO C., JORDAN A., METTA-MAGANA A. J., PINK M.,* AND FORTIER S.* REDOX CHARACTER AND SMALL MOLECULE REACTIVITY OF A MASKED TITANIUM(II) SYNTHON. *ORGANOMETALLICS* 2020, 39, 295-311.
15. **GÓMEZ-TORRES A.**, AGUILAR-CALDERÓN J. R., ENCERRADO-MANRIQUEZ A. M., PINK M., METTA-MAGANA A. J., LEE W. Y., AND FORTIER S.* TITANIUM-MEDIATED CATALYTIC HYDROGENATION OF MONOCYCLIC AND POLYCYCLIC ARENES. *CHEM. EUR. J.* 2019, 26, 2803-2807.
16. **GÓMEZ-TORRES A.**, ESPER R., DUNK P. W., MOLARES-MARTÍNEZ R., RODRÍGUEZ-FORTEA A., POBLET J. M., AND ECHEGOYEN L.* SMALL CAGE URANOFULLERENES: 27 YEARS AFTER THEIR FIRST OBSERVATION. *HELV. CHIM. ACTA* 2019, 102, E1900046.
17. FUERTES-ESPINOSA C., **GÓMEZ-TORRES A.**, MORALES-MARTINEZ R., RODRIGUEZ-FORTEA A., GARCIA-SIMON C., GANDARA F., IMAZ I., JUANHUIX J., MASPOCH D., POBLET J. M., ECHEGOYEN L.,* AND RIBAS X.* PURIFICATION OF URANIUM-BASED

ENDOHEDRAL METALLOFULLERENES (EMFS) BY SELECTIVE SUPRAMOLECULAR ENCAPSULATION AND RELEASE. ANGEW. CHEM. INT. ED. 2018, 57, 11294-11299.

BOOK CHAPTERS

18. SENGUPTA D., **GÓMEZ-TORRES A.**, AND FORTIER S.* AMIDINATES, FORMAMIDINATES, AND GUANIDINATES. COMPREHENSIVE COORDINATION CHEMISTRY III. FIGUEROA, J., ED.; ELSEVIER, LTD. 2021, 366-405.

19. **GÓMEZ-TORRES A.**, SAUCEDO C., AND FORTIER S.* ARENE COMPLEXES OF GROUP 4 METALS. COMPREHENSIVE ORGANOMETALLIC CHEMISTRY IV. MEYER, K.; O'HARE, D.; PARKIN, G., EDS.; ELSEVIER, LTD. 2021.