Meet Dr. Víctor García-López, Thieme Chemistry Journals Awardee 2025!

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Dr. Víctor García-López *received his BSc in chemistry from Monterrey Tech in Mexico in 2011. As an undergraduate, he conducted research as a visiting scholar at the University of Illinois at Urbana-Champaign (USA) and at Cinvestav in Mexico City (Mexico). He earned his PhD from Rice University (USA) in 2016 and then pursued postdoctoral research at ETH Zurich (Switzerland) from 2016 to 2018. He returned to Rice University as a postdoctoral fellow, supported by the 2019 Career Award at the Scientific Interface from the Burroughs Wellcome Fund. In Fall 2020, he joined Louisiana State University (USA) as an assistant professor.*

Thieme: Which field of organic chemistry are you interested in the most and why?

Dr. García-López: I work in the field of molecular machines and switches. I'm fascinated by how we can design organic molecules with precise control over their motion and conformation in response to external stimuli, such as light. Manipulating these dynamic systems at the molecular level opens exciting possibilities for applications in medicine, nanotechnology, and materials science.

Thieme: Following that, what is the focus of your current research activity?

Dr. García-López: My research focuses on designing and synthesizing molecular machines and switches for biological applications, particularly molecules that seamlessly integrate and operate in biological membranes. I am especially interested in developing new methods to control membrane structure and function, as membranes play a crucial role in cellular processes. Beyond acting as physical barriers, membranes contain proteins essential for vital cell functions such as signaling, transport, and enzymatic activity. I leverage molecular machines to influence cell signaling pathways, regulate membrane permeability, and develop strategies to combat serious diseases.

Thieme: What do you think about the modern role and prospects of organic chemistry?

Dr. García-López: I believe organic chemistry will remain a cornerstone of the chemical and pharmaceutical industries, continuing to play a critical role in producing countless materials and medicines. A few years ago, I read an article in *C&EN* about the resurgence of small molecules as a powerful tool in therapeutic development. Chemists are designing molecules with new modes of action, offering advantages over biotherapeutics in some instances. Rather than being replaced, organic molecule-based drugs will continue to expand, working alongside biotherapeutics to combat life-threatening diseases.

Like all scientific fields, organic chemistry is evolving. The integration of organic synthesis with artificial intelligence, sustainability, and bioengineering is already pushing the boundaries of what is possible. Looking ahead, I envision a bright future where organic chemistry drives innovations in “smart” drugs, molecular-level computing, and self-healing materials—seamlessly integrating with biological systems to address global challenges in health, technology, and sustainability.

Thieme: Which difficulties are there for young upcoming chemists in your field? Do you have any tips?

Dr. García-López: One challenge I see for new students entering my group is that working with molecular switches and machines requires interdisciplinary knowledge. While the foundation is organic chemistry, a strong grasp of photochemistry, physical organic chemistry, and aspects of biology is essential. Unfortunately, many academic programs still follow traditional curricula, offering limited opportunities for interdisciplinary learning. Some students hesitate to step outside their comfort zones, feeling intimidated by unfamiliar fields. For example, some students may see biophysics as outside their expertise, or they may shy away from biological concepts because they don’t identify as biologists. Likewise, integrating artificial intelligence and sustainability into chemical research is becoming increasingly important, yet many students receive little exposure to these areas. My advice to young chemists is to stay curious, keep an open mind, and embrace learning beyond one’s immediate expertise. Exploring new disciplines broadens one’s skill set and creates exciting opportunities at the intersection of organic chemistry and other fields, where some of the most ground-breaking innovations are taking place.

Thieme: What is your most important scientific achievement to date and why?

Dr. García-López: One accomplishment I am particularly proud of is the synthesis of our small dipole nanocar. Although it is a relatively simple molecule, its design was carefully thought out, and it exhibited exceptional dynamic properties on a surface in response to electric fields. It was one of the first molecules to demonstrate controlled unidirectional rotation at the time. Another significant achievement was using molecular motors to kill cancer cells, which have since been expanded to target bacteria and fungi, regulate biological responses, and influence membrane dynamics. This project opened doors to exciting opportunities, and I believe molecular motors will continue to play a vital role in developing applications in biology and medicine.

Thieme: Could you tell us something about yourself outside the lab, such as your hobbies or extra-work interests?

Dr. García-López: I grew up playing baseball and later transitioned to amateur softball in college to better focus on my chemistry courses and research. During my PhD, I played on two softball teams, and we won the league title several times. This helped me maintain a healthy balance between research and personal life. While I play less frequently now, I plan to get back into it more regularly. I’ve also developed a deep passion for horology. I find watches fascinating; they are exquisite machines with intricate components working together perfectly. In many ways, they remind me of molecular machines, where each part plays a crucial role in the overall function of the system.