

An organometallic perspective to first-row transition metal catalysis

Dra. Alicia Casitas

Assistant Professor

Philipps-Universität Marburg. Alemania

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C/ Pedro Cerbuna, 12. Zaragoza 50009. Spain



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Jun.-Prof. Dr. Alicia Casitas

Abstract:

Catalysis plays a pivotal role in the development of environmentally friendly and efficient chemical processes towards the synthesis of high-value chemicals from abundant and renewable feedstocks. On the quest of more sustainable synthesis, our research group focuses on the discovery and development of organic reactions catalyzed by middle and late first-row metals (Mn, Fe, Co, Ni). Transition-metal catalyzed nucleophilic allylic substitutions are well-established methods for the construction of carbon-carbon and carbon-heteroatom bonds in organic synthesis. In this communication, I will present our work in regioselective cobalt(I)-catalyzed nucleophilic allylic substitution reactions. This project aims at finding complementary reactivity to the well-established methods that involve precious metals, while providing an in-depth mechanistic understanding.^[1] In the second part of the talk, I will introduce fundamental insights into the reactivity of organoiron species in high oxidation state, which may ultimately find application in catalysis towards organic synthesis. Thus, synthetic strategies to prepare Fe^{III} and Fe^{IV} cyanide complexes using hypervalent iodine reagents will be disclosed.^[2] Finally, I will present our ongoing work on the synthesis of highly reactive organometallic Fe^{III} and Fe^{IV} complexes and their involvement in carbon-carbon bond-forming reactions.^[3]

Biography:



Alicia Casitas received her Chemistry Degree in 2007 from Universitat de Girona (Spain), where she also obtained her PhD in 2012 under the supervision of Prof. Xavi Ribas and Prof. Miquel Costas. During the graduate period, she spent 3 months as a visiting student in the group of Prof. Shannon S. Stahl at University of Madison-Wisconsin (US, 2009) and another 3 months in the group of Prof. Matthew J. Gaunt at University of Cambridge (UK, 2011). Then, she pursued postdoctoral studies at Max-Planck-Institut für Kohlenforschung (Germany) in the group of Prof. Alois Fürstner (2013–2015) and at Institut Català d'Investigació Química (ICIQ, Spain) in Prof. Julio Lloret-Fillol's group (2016–2018). In July 2018, she moved to Institut de Química

Computacional i Catàlisi (IQCC) in Girona as a junior group leader funded by a Junior-Leader LaCaixa Postdoctoral Fellowship. Since July 2019 Alicia is an Assistant Professor (W1) in Organic Chemistry in the Faculty of Chemistry at Philipps-Universität Marburg (Germany). In 2021 she received the Thieme Chemistry Journals Award and in 2023 the Junior Scientist Program (JSP) Fellowship to attend the Bürgenstock conference (Switzerland). Her research interests include fundamental organometallic chemistry studies and the development of sustainable synthetic methodologies towards bond-forming reactions with first-row transition metals.

References:

- [1] Andreetta, P.; Martin, R. T.; Souilah, C.; Rentería-Gómez, A.; Zihui Song, Z.; Khorramshahi Bayat, Y.; Ivlev, S.; Gutierrez, O.; Casitas, A. *Angew. Chem. Int. Ed.* **2023**, *62*, e202310129.
- [2] Souilah, C.; Jannuzzi, S. A. V.; Demirbas, D.; Ivlev, S.; Swart, M.; DeBeer, S.; Casitas, A. *Angew. Chem. Int. Ed.* **2022**, *61*, e202201699.
- [3] Souilah, C.; Jannuzzi, S. A. V.; Demirbas, D.; Ivlev, S.; Xie, X.; Peredkov, S.; DeBeer, S.; Casitas, A. *under review*.