

SYNLETT Best Paper Award 2021: Nickel-Catalyzed Cross-Electrophile Coupling of the Difluoromethyl Group for Fluorinated Cyclopropane Synthesis

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Background and Purpose. Thieme Chemistry and the Editors of *SYNTHESIS* and *SYNLETT* present the ‘*SYNTHESIS/ SYNLETT Best Paper Awards*’. These annual awards honor the authors of the best original research papers in each of the journals, considering their immediate impact on the field of chemical synthesis. Professor Elizabeth Jarvo, Dr. Erika Lucas, Mr. Tristan McGinnis and Mr. Anthony Castro from the University of California-Irvine, USA, are the recipients of the *SYNLETT Best Paper Award 2021*. In announcing this year’s winners, Benjamin List, Editor-in-Chief of *SYNLETT*, noted: “In their brilliant work, Jarvo and co-workers have invented a conceptually new approach to fluorinated cyclopropanes. It is based on a photocatalytic styrene methoxy difluoromethylation, the products of which are elegantly used in a nickel-catalyzed intramolecular cross-electrophile coupling reaction between the difluoromethyl moiety and the methyl ether. This work is highly creative and timely and an excellent example what *SYNLETT* readers can expect.” *SYNFORM* spoke with Professor Elizabeth Jarvo, who was happy to share some background information regarding the prize-winning paper as well as current research activities ongoing in her group.

Biographical Sketch



From left: Prof. E. Jarvo, Mr. T. McGinnis, Mr. A. Castro and Dr. E. Lucas

Elizabeth Jarvo was born in Nova Scotia, Canada. She earned her B.Sc. (Honours) from Acadia University (Canada) working in the laboratory of Michael A. Kerr and was a summer NSERC student at Concordia University (Canada) with Youla Tsantrizos. She carried out her Ph.D. studies under the direction of Scott J. Miller at Boston College (USA), and postdoctoral studies with Eric N. Jacobsen at Harvard University (USA). In 2005 she joined the faculty at the University of California, Irvine (USA) and has

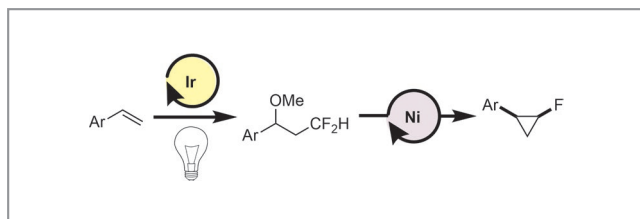
been a Full Professor since 2016. Her research program focuses on the development of new catalytic reactions including stereospecific cross-coupling and cross-electrophile coupling reactions using nickel catalysts.

Professor Jarvo has received many awards during her career: In 2005, she was awarded both the Amgen New Faculty Award and the Lilly New Faculty Award. In 2006, she received the ACS-PRF Type G award, followed by the NSF CAREER Award in 2008 and the UCI School of Physical Sciences Outstanding Contributions to Undergraduate Education Award in 2009. In 2010, she was a recipient of the Thieme Chemistry Journals Award. Other awards have followed: ACS Women in Chemistry Committee Rising Star Award (2014), Japan Society for Promotion of Science (JSPS) Fellowship (2015), UCI Chancellor’s Faculty Fellow (2017–2020), Novartis Chemistry Lectureship (2017/2018), Chemmy Award, Emory Department of Chemistry (2020), Journal of Organic Chemistry 2020 Outstanding Article of the Year and now the *SYNLETT Best Paper Award 2021*.

INTERVIEW

SYNFORM *Could you highlight the value of your award-winning paper with respect to the state-of-the-art, as well as the potential or actual applications?*

Prof. E. Jarvo We think that this chemistry will be of conceptual interest to colleagues in academia and the pharmaceutical industry. The product of the transformation is a fluorinated cyclopropane (Scheme 1), an interesting pharmacophore that has few synthetic approaches. Furthermore, the approach connects emerging methods for photocatalytic difluoromethylation of alkenes with a nickel-catalyzed cross-electrophile coupling (XEC) reaction.



Scheme 1

SYNFORM *Can you explain the origin, motivations and strategy used for conducting the award-winning research?*

Prof. E. Jarvo Our group previously established intramolecular XEC reactions of the strong C–F bonds of alkyl fluorides. We sought to extend this reactivity to include the difluoromethyl group, a particular challenge for multiple reasons including strength of the C–F bonds and strain associated with the reaction products.

SYNFORM *What is the focus of your current research activity, both related to the award paper and in general?*

Prof. E. Jarvo My laboratory is interested in the design of new catalytic reactions, particularly in the use of base metal catalysts to form challenging C–C bonds. New reaction development and improved mechanistic understanding dovetail with each other. By developing certain transformations we can better define the key features of catalysts that control reactivity, and hopefully apply this understanding in discovery of the next series of transformations.

SYNFORM *What do you think about the modern role, major challenges and prospects of organic synthesis?*

Prof. E. Jarvo I think major challenges in organic synthesis continue to be issues of selectivity and sustainability. Catalysts can play a key role in addressing both of these features.

SYNFORM *What does this award mean to you/your group?*

Prof. E. Jarvo This award is wonderful recognition of Erika, Tristan and Anthony's creativity, passion and hard work on this project.

Matthew Jarvo