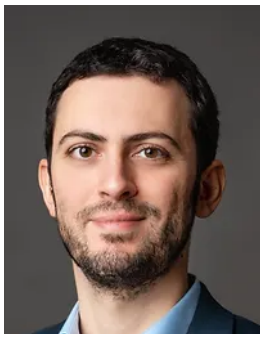
Single-atom catalysts for light-driven C-X coupling methods



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New catalytic materials are urgently needed to drive the transition to a cleaner and more sustainable future. Single-atom catalysts are the frontier of catalysis engineering, and they can accelerate the shift to greener chemical processes due to their groundbreaking reactivity and the ability to economize the amount of critical raw materials. In this lecture, I will present my group's work in this emerging field, from the discovery of these new catalysts to the possibility of using these materials in place of organometallic catalysts in organic transformations. With the help of density functional theory calculations and characterization studies, I will also elucidate the structure of these materials and the charge transfer driving the reaction mechanism. Finally, I will demonstrate how the catalysts can be nanostructured in flow microreactors to obtain structured thin films and foams with integrated single-atom functionalities.

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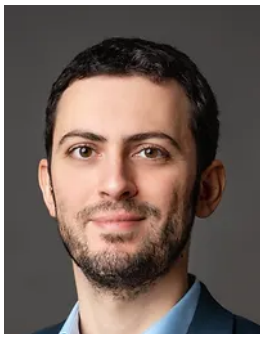

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BIO

Prof. Dr. Gianvito Vilé graduated with honors in Chemical Engineering from Politecnico di Milano and received his PhD from ETH Zurich, with the ETH medal for his thesis. He is currently Associate Professor of Chemical Processes at Politecnico di Milano. His research focuses on understanding the structure and reactivity of single-atom catalysts, and designing continuous catalytic processes with pharmaceutical relevance. He has received several awards for his research, including the ETH Medal, the Dimistris N. Chorafas Award from the Weizmann Institute of Sciences, the Felder Award from the pharmaceutical company Bracco, and the ERC Starting Grant from the European Research Council. He is the coordinator or partner of several European projects (SAC_2.0, GreenDigiPharma, SSEFR, SACforCO2, and SusPharma). He is also expert evaluator or panel member for several national or international scientific foundations.
Gianvito is Fellow of the Young Academy of Europe, a pan-European academy of 200 top young scientists and scholars from every discipline in Europe, connected with the Academia Europaea. He is also Editorial or Advisory Board Member of Applied Catalysis B, ChemCatChem, ACS ES&T Engineering, CEP:PI, and Chemical Science.