Single-Atom Catalysts for Greener Chemical Synthesis

Prof. Dr. Gianvito Vilé
Department of Chemistry, Materials, and Chemical Engineering "Giulio Natta"
Politecnico di Milano

E-mail: gianvito.vile@polimi.it *Twitter:* VileGroup *Website:* vile-researchgroup.com

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.