Interfaces & Nanomaterials for Catalysis (INCAT)

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The Interfaces & Nanomaterials for Catalysis (**INCAT**) group focuses on the rational design of innovative materials for applications in sustainable electro- thermo- and photo- catalysis. We follow a knowledge-driven approach based on the combination of advanced synthesis methods (chemical vapor deposition, solvothermal synthesis, aerosol process etc.) and sophisticated characterization techniques (electron spectroscopies, scanning probe microscopies) and operando studies (EC-STM, EXAFS, Raman spectroscopy).Our main research activities cover the study of emerging 2D materials, multiscale organic-inorganic hybrids (MOFs/COFs, functionalized carbon nanomaterials), and engineered single atom catalysts, for hydrogen electrochemical production, fine chemical synthesis through Green Chemistry methods, and CO_2 valorisation.

1. *Atom-by-atom identification of catalytic active sites in operando conditions by quantitative noise detection*, Joule, **2022**, 6, 617 - 635.
2. *Operando visualization of the hydrogen evolution reaction with atomic-scale precision at different metal–graphene interfaces*, Nature Catalysis, **2021**, 4, 850 - 859.
3. *Copper single-atoms embedded in 2D graphitic carbon nitride for the CO_2 reduction*, npj 2D Materials and Applications, **2021**, 5, 1 - 10.
4. *Hybridization of Molecular and Graphene Materials for CO_2 Photocatalytic Reduction with Selectivity Control*, Journal of the American Chemical Society, **2021**, 143, 8414-8425.
5. *Palladium nanoparticles supported on graphene acid: A stable and eco-friendly bifunctional C–C homo-and cross-coupling catalyst*, Green Chemistry, **2019**, 21, 5238-5247.