INTCATGOLD

New inter- and intramolecular reactions catalyzed by gold

Timeline | 09/2023 to 08/2026

ICIQ People | A. Echavarren Research Group

Budget | 450.000 €

Call | Proyectos I+D - Generación Conocimiento 2022

SUMMARY

With this project, we will contribute to the advancement of the field of gold homogeneous catalysis by synthesizing advanced chiral gold catalysts that mimic the characteristics of enzymes and to develop new synthetic methods based on the activation of acetylene gas, a commodity in industry. The synthetic potential of our developed methods will be applied for the late-stage functionalization of complex molecules and for the synthesis of natural products. Specifically, we will prepare new chiral gold(I) catalysts with very bulky ligands as well as catalysts with urea or squaramide units to anchor the chiral anion in a well-defined position. We will also synthesize gold(I) catalysts derived from chiral cavitands and other simpler phosphite gold(I) complexes derived from binols or ferrocene scaffolds. We will also explore new synthetic applications based on the activation of acetylene gas. Thus, we propose to apply the gold(I)-catalyzed metathesistype reaction of alkenes with acetylene for the stereo-defined synthesis of 1,3-butadienes and for the late-stage diversification of pharmaceuticals. Another major goal of this research is the development of new enantioselective fully intermolecular three-component reactions of acetylene with alkenes and heteronucleophiles (or carbon nucleophiles). We also propose to develop a new (4+3) cycloaddition for the synthesis of alkaloids based on the decarbenation of indole-substituted cycloheptatrienes and to study cascade polycyclization reactions for the synthesis of antiviral persicamidines as well as to accomplish a concise synthesis of hernandulcin, a noncaloric natural sweetener.

WORK PLAN

OBJECTIVES	Year 1	Year 2	Year 3
1. NEW CHIRAL GOLD(I)-CATALYSTS OF BROAD GENERAL SCOPE			
2. ACTIVATION OF ACETYLENE GAS			
3. INTERMOLECULAR, THREE COMPONENT REACTIONS			
4. NEW METHODOLOGIES FOR TOTAL SYNTHESES			

Reference: PID2022236623NB-I00