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Copper nanoparticles in organic synthesis

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Some years ago, we developed a catalyst consisting of copper nanoparticles on activated carbon (CuNPs/C) which was shown to be very versatile in the synthesis of 1,2,3-triazoles through click chemistry. More recently, we have effectively accomplished the multicomponent synthesis of indolizines using 0.5 mol% CuNPs/C as catalyst in dichloromethane. Interestingly, the same procedure, when applied in the absence of solvent using piperidine as the secondary amine, has led to heterocyclic chalcones with exclusive Z stereochemistry. The copper-catalyzed three-component synthesis of indolizines, when followed by heterogeneous catalytic hydrogenation, allowed the straightforward preparation 1-dialkylamino-3-substituted indolizidines with high chemo- and diastereoselectivity, through an overall atom-economy protocol. Copper nanoparticles on zeolite Y has been found to be an effective catalyst for the cross-dehydrogenative coupling of tertiary amines and terminal alkynes (producing propargylamines) in the presence of tert-butyl hydroperoxide as the oxidant, without the need of an inert atmosphere and in the absence of solvent, using 1.5 mol% catalyst. The catalyst is reusable and more efficient than an array of commercial catalysts. All types of compounds presented, 1,2,3-triazoles, indolizines, chalcones, indolizidines and propargylamines, are of pharmacological interest, some of which have shown *in-vitro* prominent activity.

Biography

Francisco Alonso received his BSc (1986), MSc (1988) and PhD (1991) degrees in Chemistry from the University of Alicante (Spain). After a Postdoctoral stay (1992–1994) at the University of Oxford (UK) with Prof. S G Davies, he moved back to the University of Alicante, where he is Full Professor of Organic Chemistry, Director of the Instituto de Síntesis Orgánica (ISO) and Coordinator of the Doctorate Programme "Organic Synthesis". He has authored 115 manuscripts, 3 patents and several book chapters and has been Co-founder of Medalchemy S L. His research is focused on the development of new synthetic methodologies involving transition-metal nanoparticles and on the synthesis of biologically active natural or synthetic molecules. He is a Member of the Advisory Board of *Current Green Chemistry*.

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