Industrial Organic Reactions with Solid Catalysts

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Chemical industry moves >€3000 billion worldwide, and it represents the 6% of the gross domestic product in Spain. Thus, the synthesis of chemicals is paramount for industrial development. Industrial organic reactions are little explored with solid material catalysts, since the latter have been traditionally used in fields somewhat away of organic synthesis, such as petrochemistry and water treatment, to name a few. Here, we show different approaches to use (nanostructured) solid catalysts for organic reactions of industrial interest, with potential implementation in real processes. For the sake of illustration, the case of the hydrosilylation of alkenes and alkynes,[1] cyanosilylation of ketones,[2] antitumoral heterocyle formation,[3] carbon–carbon cross–coupling reactions[4] and acetal hydrolysis,[5] will be commented here. Other reactions of potential interest in industrial organic synthesis such as the carbonyl–olefin metathesis,[6] the Büchner [7] and the Nazarov reactions,[8] will be also shown. The talk will describe how the design of a nanostructured solid catalyst is able to completely reverse the regioselectivity of organic reactions, and how supported metal species give access to multifunctional catalysts, where the nanostructured solid-metal interaction plays a key role during the catalysis.

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Antonio Leyva-Pérez was born and grew up in Seville (Spain). He carried out the Ph.D. on heterogeneous catalysis under the supervision of Prof. Hermenegildo García, at The Polythecnic University of Valencia. His thesis received the Special Award of the Polytechnic University of Valencia in 2006. After a short stay in the M.I.T. at Prof. Steven L. Buchwald´s laboratories, working in organometallics, he did post–doctoral studies in the Chemistry Department of The University of Cambridge at Prof. Steven Ley´s group, working in the total synthesis of the complex natural products isobongregic acid and epyriculol. In 2008, he returned to the ITQ to work with Prof. Avelino Corma in catalysis. After receiving a Ramon y Cajal research contract in 2014 and a Distinguished Research position in 2016, he currently leads the group of Catalysis for Sustainable Organic Reactions at the ITQ.