DESCRIPTION

Transition metal-catalyzed coupling reactions have a rich history that led to the awarding of the 2010 Nobel Prize in Chemistry to Professors Suzuki, Heck, and Negishi for their pioneering contributions to the field. The coming of age of this active area of research is showcased in this book through case studies in which process chemists from the pharmaceutical industry share their personal experiences developing their own transition metal-catalyzed couplings for the large-scale manufacture of active pharmaceutical ingredients.

Authors from Pfizer, Merck, Boehringer-Ingelheim, Novartis, Amgen, GSK, AstraZeneca, and other companies describe the evolution of robust coupling processes from inception through early and late development, including commercial routes where applicable. This book covers a wide range of coupling transformations while capturing the lessons learned from each process. Every case study details the optimization of at least one transition metal-catalyzed coupling while elaborating on issues such as design of experiments, scalability and throughput, product purification, process safety, and waste management. The important issue of metal removal and the different technologies available to accomplish this goal are also addressed. Finally, a section covers novel technologies for cross-coupling with high potential for future applications on a large scale, such as microwave and flow chemistry as well as green cross-couplings performed in water.

Javier Magano was born in Madrid, Spain. He received a B.S. in organic chemistry from Complutense University in Madrid in 1987 and a M.Sc. degree in chemistry from the University of Michigan in 1990. After working for the oil industry in Spain for several years, he obtained a M.Sci. degree in rubber and polymer science at the Center for Advanced Scientific Research in Madrid. After moving back to the United States, he joined the early process chemistry group at Pfizer in 1998 in Ann Arbor, MI, where he spent nine years developing scalable processes for the preparation of drug candidates. In 2007, he moved to Groton, CT to continue his work as a process chemist and, during this period, he has also worked in the area of biologics for 1.5 years on the preparation of linkers for bioconjugation processes. Javier currently holds a position in the Chemical Technology group at Pfizer, where he is involved in the applications of high-throughput screening to transition metal-catalyzed couplings. His research interests also include the development of catalytic processes that employ non-precious metals in coupling reactions.

Joshua R. Dunetz graduated from Haverford College in 2000 with a B.A. in Chemistry after undergraduate research with Professor Karin Åkerfeldt. He received his Ph.D. in Organic Chemistry from MIT in 2005 under the guidance of Professor Rick Danheiser, and then completed postdoctoral studies with Professor William Roush at Scripps Florida. In early 2008, Joshua assumed his current position with Pfizer Chemical R&D in which he develops processes for the GMP manufacture of small molecules on gram to multikilogram scale.

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