Don M Coltart, Chem Sci J 2017, 8:2(Suppl)
http://dx.doi.org/10.4172/2150-3494-C1-007



# 4th European Chemistry Congress



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## An umpolung approach to the asymmetric α-alkylation of aldehydes and ketones

The asymmetric alkylation of carbonyl compounds is a fundamental synthetic transformation. Remarkably, despite its importance, there is no general way to conduct this transformation in a catalytic asymmetric fashion. The umpolung-based alkylation of ketones and aldehydes wherein an organometallic species adds to an electrophilic carbon through the intermediacy of a derived azo- or nitrosoalkene provides an appealing approach to effecting this transformation. Not only does such an approach allow for the incorporation of functionality that cannot be introduced using enolate chemistry, but it is also well suited to catalysis and adaptable for asymmetric induction. Given the wide range of structures available as organometallic reagents (e.g., 1°, 2°, 3° alkyl, aryl, vinyl, alkynyl, etc.), this approach to catalytic asymmetric alkylation is also likely to prove broad in scope. Herein, we describe our recent efforts to exploit this mode of reactivity to provide a solution to the long-standing problem of developing a general, catalytic asymmetric approach to the alkylation of carbonyl compounds.

### Biography

Don Coltart obtained his Master's degree from the University of Manitoba under the supervision of Professor James L. Charlton, and he then joined the research group of Professor Derrick L. J. Clive at the University of Alberta where he obtained his Ph.D. His postdoctoral work was conducted at the Memorial Sloan-Kettering Cancer Center as an NSERC, AHFMR, and CRI Scholar under the supervision of Professor Samuel J. Danishefsky. Don began his independent career at Duke University in 2004 and moved to the University of Houston in 2012. His research group studies the development of methods for asymmetric carbon–carbon bond formation, the application of those methods to the total synthesis of structurally complex biologically active natural products, and the study of those compounds in biological systems.

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