CiQUS

Centro Singular de Investigación en Química Biolóxica e Materiais Moleculares

Conferencia:

18-19/Marzo/2013

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Michael C. Willis
(University of Oxford)

New Heterocycle Syntheses and Sulfonylation Processes Using Pd and Cu Catalysis

18/03/13
12:15 h

New Reactivity and Selectivity in Rh Catalysed C-C Bond-Formation

19/03/13
11:00 h

Aula de Seminarios do CIQUS

Máis información:

FEDER - FONDO EUROPEO DE DESENVOLVEMENTO REXIONAL
"Unha maneira de facer Europa"
UNIÓN EUROPEA

XUNTA DE GALICIA
CONSELLERÍA DE CULTURA, EDUCACIÓN E ORDENACIÓN UNIVERSITARIA

18th March:

New Heterocycle Syntheses and Sulfonylation Processes Using Pd and Cu Catalysis

The talk will details our studies using cascade catalytic processes, based on both Pd- and Cu-catalysis, to access a variety of important heterocyclic structures from a single family of acyclic precursors. Routes to indoles, benzofurans, quinolones, isoquinolines and cinnolines, all from the same precursors, will be presented. We will also present our work on the development of new sulfonylation methods, and the discovery of the commercially available SO_2-surrogate DABSO.

19th March:

New Reactivity and Selectivity in Rh Catalysed C-C Bond-Formation

We have developed a series of Rh-catalysed alkene, alkyne and allene hydroacylation processes that allow the efficient and controlled synthesis of a variety of carbonyl-containing products. The talk will focus on the development of these reactions, the selectivity that can be achieved, and some simple applications. We will also present very recent work that details the development of a new family of Rh-catalysed processes all based on the activation of C-S bonds.

Dr Michael C. Willis

Department of Chemistry, University of Oxford, Oxford, OX1 3TA, UK
Tel; 01865 285126 Fax; 01865 285002 Mob; 07867 801 003
michael.willis@chem.ox.ac.uk
http://mcwillis.chem.ox.ac.uk/MCW/Home.html

Date of Birth: December 31, 1970

Employment

Jan. 2007-	University Lecturer and Fellow of Lincoln College, University of Oxford
Oct. 2005-10	EPSRC Advanced Research Fellow
2004-07	Senior Lecturer in Organic Chemistry, University of Bath
1997-2004	Lecturer in Organic Chemistry, University of Bath
1995-1997	NATO / Royal Society Postdoctoral Fellow, Department of Chemistry, Harvard University, Cambridge, MA, USA. With Prof. D. A. Evans.

Education

1992-95	Ph.D., Organic Chemistry, University of Cambridge. With Prof. S. V. Ley.
1989-92	Imperial College of Science, Technology and Medicine, University of London B.Sc. (Hons), first class, Chemistry; Associateship of the Royal College of Science.

Professional Membership and External Professional Activities

2006-09	Executive committee of the Organic Division of the Royal Society of Chemistry
2006-11	Consultant, Pfizer Chemical Research and Development, Sandwich, UK
2005-	Committee member of the Fine Chemicals Group of the Society of Chemical Industry
2002-05	Chair, Young Chemists Panel of the Fine Chemicals Group of the Society of Chemical Industry
1996-	American Chemical Society, Member
1995-	Royal Society of Chemistry, FRSC (C.Chem). FRSC from 2012.

Awards and Scholarships

2011	*Organic and Biomolecular Chemistry* Lecture Award
2008	AstraZeneca Award in Synthetic Organic Chemistry
2008	Thieme Journal Prize
1995-96	Royal Society / NATO Postdoctoral Research Fellow, with Prof. David A. Evans, Harvard University, USA
1995	Stothart Bye-Fellow, Magdalene College, Cambridge

Selected Recent Publications

(87) "Carbon-carbon bond construction using boronic acids and aryl methyl sulfides: Orthogonal reactivity in Suzuki-type couplings", Joel F. Hooper, Rowan D. Young, Indrek Pernik, Andrew S. Weller and Michael C. Willis, *Chem. Sci.* **2013**, *4*, 1568 – 1572. (doi: 10.1039/c0xx00000x)

(86) "Traceless chelation-controlled rhodium-catalyzed intermolecular alkene and alkyne hydroacylation", Joel F. Hooper, Rowan D. Young, Andrew S. Weller and Michael C. Willis, *Chem. – Eur. J.* **2013**, *19*, 3125 – 3130. (doi: 10.1002/chem.201204056)

(84) "Catalytic enantioselective desymmetrization as a tool for the synthesis of hodgkinsine and hodgkinsine B", Robert H. Snell, Matthew J. Durbin, Robert L. Woodward and Michael C. Willis, *Chem. – Eur. J.* **2012**, *18*, 16754 – 16764. (doi:10.1002/chem. 201203150)

(83) "Exploring small bite–angle ligands for the rhodium–catalyzed intermolecular hydroacylation of β–*S*–substituted aldehydes with 1–octene and 1–octyne", Indrek Pernik, Joel F. Hooper, Adrian B. Chaplin, Andrew S. Weller* and Michael C. Willis, *ACS Catalysis*, **2012**, *2*, 2779 - 2786. (doi: 10.1021/cs300541m)

(81) "Palladium-catalyzed synthesis of benzimidazoles and quinazolinones from common precursors", Jessie E.R. Sadig, Radleigh Foster, Florian Wakenhut and Michael C. Willis, *J. Org. Chem.* **2012**, *77*, 9473 – 9486. (doi: 10.1021/jo301805d). Selected as a "Feature Article".

(80) "Intermolecular Alkyne Hydroacylation. Mechanistic Insight from the Isolation of the Vinyl Intermediate that Precedes Reductive Elimination", Rebekah Pawley, Miguel Huertos, Guy Lloyd–Jones, Andrew S. Weller*, Michael C. Willis, *Organometallics* **2012**, *31*, 5650 – 5659. (doi: 10.1021/om300647n)

(79) "Rhodium-Catalysed Linear-Selective Alkyne Hydroacylation", Sarah-Jane Poingdestre, Jonathan D. Goodacre, Andrew S. Weller and Michael C. Willis, *Chem. Commun.* **2012**, *48*, 6354-6356. (doi: 10.1039/c2cc32713a)

(78) "Copper-Catalyzed Tandem C-N Bond Formation: An Efficient Annulative Synthesis of Functionalised Cinnolines", Catherine J. Ball, Jeremy Gilmore and Michael C. Willis, *Angew. Chemie. Int. Ed.* **2012**, 5718 – 5722. (doi: 10.1002/anie.201201529)

(77) "Palladium-Catalysed Aminosulfonylation of Aryl-, Alkenyl- and Heteroaryl Halides: Scope of the Three-Component Synthesis of *N*-Aminosulfonamides", Edward J. Emmett, Charlotte S. Richards-Taylor, Bao Nguyen, Alfonso Garcia-Rubia, Barry R. Hayter and Michael C. Willis, *Org. Biomol. Chem.* **2012**, *10*, 4007 – 4014. (doi; 10.1039/C2OB0 7034K)

(76) "Intermolecular hydroacylation: High Activity Rhodium Catalysts Containing Small Bite Angle Diphosphine Ligands", Adrian B. Chaplin, Joel F. Hooper, Andrew S. Weller and Michael C. Willis, *J. Am. Chem. Soc.* **2012**, *134*, 4885 – 4897. (doi: 10.1021/ja211649a)

(74) "Aryl Methyl Sulfides as Substrates for Rhodium-Catalyzed Alkyne Carbothiolation: Arene Functionalization with Activating Group Recycling", Joel F. Hooper, Adrian B. Chaplin, Carlos González-Rodríguez, Amber L. Thompson, Andrew S. Weller and Michael C. Willis, *J. Am. Chem. Soc.* **2012**, *134*, 2906 – 2909. (doi: 10.1021/ja2108992)

(71) "An Alkyne Hydroacylation Route to Highly Substituted Furans", Philip Lenden, David A. Entwistle and Michael C. Willis, *Angew. Chem. Int. Ed.* **2011**, *50*, 10657–10660. (doi: 10.1002/anie.201105795).

(70) "DABCO-*bis*(Sulfur Dioxide), DABSO, as a Convenient Source of Sulfur Dioxide for Organic Synthesis: Utility in Sulfonamide and Sulfamide Preparation", Holly Woolven, Carlos González-Rodríguez, Isabel Marco, Amber L. Thompson and Michael C. Willis, *Org. Lett.* **2011**, *13*, 4876–4878. (doi: 10.1021/ol201957n)

(69) "Catalytic Enantioselective Total Synthesis of Hodgkinsine B", Robert H. Snell, Robert L. Woodward and Michael C. Willis, *Angew. Chem. Int. Ed.* **2011**, *50*, 9116–9119. (doi: 10.1002/anie.201103864)

(67) "Rhodium-Catalyzed Branched-Selective Alkyne Hydroacylation: A Ligand Controlled Regioselectivity Switch", Carlos González-Rodríguez, Rebekah J. Pawley, Adrian B. Chaplin, Amber L. Thompson, Andrew S. Weller and Michael C. Willis, *Angew Chem. Int. Ed.* **2011**, *50*, 5134 –5138. (doi: 10.1002/anie.201100956)

(66) "*O*-Substituted Alkyl Aldehydes for Rhodium-Catalyzed Intermolecular Alkyne Hydroacylation: The Utility of Methylthiomethyl-Ethers", Scott R. Parsons, Joel F. Hooper and Michael C. Willis, *Org. Lett.* **2011**, *13*, 998–1000. (doi: 10.1021/ol1030662)

(64) "Palladium-Catalyzed Aminosulfonylation of Aryl Halides", Bao Nguyen, Edward J. Emmett and Michael C. Willis, *J. Am. Chem. Soc.* **2010**, *132*, 16372–16373. (doi: 10.1021/ja1081124)

(62) "Cascade Palladium-Catalyzed Direct Intramolecular Arylation/Alkene Isomerization Sequences: Application to Indole and Benzofuran Synthesis", Myriam Yagoubi, Ana C. F. Cruz, Paula L. Nichols, Richard L. Elliott and Michael C. Willis, *Angew. Chem. Int. Ed.* **2010**, *49*, 7958 – 7962. (doi: 10.1002/anie.201004097)

(61) "Rhodium-Catalyzed Intermolecular Alkyne Hydroacylation: The Enantioselective Synthesis of a- and b-Substituted Ketones *via* Kinetic Resolution", Carlos González-Rodríguez, Scott R. Parsons, Amber L. Thompson and Michael C. Willis, *Chem. Eur. J.* **2010**, *16*, 10950 – 10954. (doi: 10.1002/chem.201001748)

(58) "Controlling Selectivity in Intermolecular Alkene or Aldehyde Hydroacylation Reactions Catalysed by $\{Rh(L_2)\}^+$ Fragments", Rebekah J. Pawley, Gemma L. Moxham, Romaeo Dallanegra, Adrian B. Chaplin, Simon K. Brayshaw, Andrew S. Weller* and Michael C. Willis, *Organometallics* **2010**, *29*, 1717–1728. (doi: 10.1021/om9011104)

(56) "Transition Metal Catalyzed Alkene and Alkyne Hydroacylation", Michael C. Willis, *Chem. Rev.* **2010**, *110*, 725-748. (doi: 10.1021/cr900096x)

Research in the Willis Group

Research in the group is focused on the development of new catalytic processes for organic synthesis. Particular emphasis is placed on employing readily available materials to deliver high-value products. Heterocycle synthesis, C-H functionalization and sulfonylation methods are some current areas of interest.