MICHAEL CHARLES STANDEN

2600 NW Century Dr
Apt# 143
Corvallis, OR 97330

Phone: 541 286 8436
email: mchstanden@gmail.com
mike.standen@valliscor.com

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SUMMARY

PhD in Organic chemistry. 33 years industrial experience of agrochemical and pharmaceutical Fine Chemical process research and development. 10 years of technical sales and project management. 3 years post-doctoral experience in physical organic, synthetic and organo-fluorine chemistry. Extensive experience in human technical resource management, motivation and mentoring.

PROFESSIONAL EXPERIENCE

Valliscor LLC, Corvallis OR

July 2015 – to date *Chief Operating Officer*

Co-founder of company together with Rich Carter - registered in July 2012. In charge of all Valliscor manufacturing operations, new product development, quality assurance and safety.

Valliscor is a smart chemical manufacturing company that provides innovative solutions for access of fluorinated building blocks and enantiomerically enriched scaffolds for pharmaceutical, agrochemical, polymer and electronics industries. I have led small teams to develop 2 commercial products manufactured using continuous flow technology.

Lacamas Laboratories, Portland OR

April 2013 to July 2015 *Chief Technology Officer (CTO)*

In charge of R&D and QC. Driving the technology base of the company and process development activities. Day to day project management of new and existing projects and troubleshooting for plant processes. Building GLP / GMP systems to ensure “quality by design” and meeting the needs of pharmaceutical customers. Project management of analytical method validation activities to support GMP manufacture of a commercial API intermediate. Complete re-writing and design of new Lacamas Labs website launched in September 2014.

W R Grace (Formerly Synthetech Inc.) Albany OR

2011 to April 2013 *Senior Principal Scientist*

I was responsible for the development of new process technologies for strategic products. Also, evaluated new custom projects, developed costing frameworks and quotation templates for new projects. The remit was to broaden the technology base of the organization and develop strategic IP positions. I worked closely with R&D, Sales and Operations to ensure rapid flow of projects for on time customer delivery.

Synthetech Inc., Albany OR

2007 to 2011 *Technical Director*

As part of the senior management team, I was responsible for the development of new technologies and identification and evaluation of new business opportunities for the company. Other responsibilities included development of new customers and projects mainly within the UK territory / Western Europe and support / troubleshooting of existing customer projects. My business development role involved many techno-commercial presentations and also project costing for both technology transfer and in-house designed processes. I invented a new continuous flow process for the manufacture of a key intermediate for an established API. I also managed the development and manufacture of a multi step API which is now successfully through Phase I clinical trials.

Synthetech Inc., Albany OR

2003 to 2007 R&D Director

Managed a team of 10 scientists in execution of kilo lab, process development and manufacturing support activities. This position involved extensive project management, technical problem solving, development and mentoring of technical staff, organization and maintenance of lab resources and ensuring adherence to standard operating, safety and environmental procedures. Worked closely with a team at Oregon State University to develop micro-reactor equipment for continuous-flow applications. This technology was successfully applied to the synthesis of intermediates using highly hazardous reagents such as azide and DAST (for oxydefluorinations).

Synthetech Inc., Albany OR

2001-2003 Process Development Scientist

Designed new synthetic routes and developed processes for scale up working closely with the operations team and QC to ensure smooth transfer to the plant. Also introduced

new technologies into the company's repertoire such as asymmetric hydrogenation and alkylation. Designed and developed novel routes to new targets with cumulative annual revenues in excess of $6M.

Zeneca Ag Products, Bucks Alabama

1997-2001 Senior Process Development Engineer

Focused on development of new agrochemical products with specific emphasis on heterocycles and organophosphorus compounds. Projects typically involved route screening and selection, initial hazard assessment, costing, optimization and interaction with chemical engineers in the process design phase. I gained experience with use of both differential scanning calorimetry (DSC) and accelerated rate calorimetry for themal hazards analysis. I also worked extensively with phosgene and liquid HCN.

Zeneca Ltd, Grangemouth, Scotland UK

1989-1997 Senior Process Development Chemist

Supervised a team of five chemists and was responsible for "early lead" development of processes for prospective new agrochemical products. Such processes would need to be sufficiently robust and operable for pilot plant manufacture. This work involved route selection, hazard assessment, costing, interface with both research and formulation functions as well as planning and direct supervision of lab work.

Worked on Friedel-Crafts processes to make monomers for high performance polymers. This work involved handling phosgene at the kilo scale and the development of processes to convert the bi-products into useful materials. I have extensive experience handling liq. hydrogen fluoride.

University of Brimingham, UK

1987-1989 Research Fellow

Carried out direct fluorinations of hydrocarbons and synthesized a range of fluorinated materials for evaluation of their thermal stabilities.

University of Texas at Austin (FULBRIGHT SCHOLARSHIP)

1986-1987 Research Fellow

Synthesized a range of novel steroid compounds used in a study of intramolecular electron transfer processes within micro-heterogeneous systems such as micelles and

micro-emulsions. This involved extensive use of pulsed laser and associated time resolved photochemical equipment.

ACHIEVEMENTS

- **Invented and commercialized (through Valliscor) a single step gas phase continuous flow process for making a key intermediate for the blockbuster drug Fluticasone propionate.**
- **Invented and commercialized (through Valliscor) a 3 step process for manufacture of a fluorinated intermediate for an on-the-market breast cancer drug. The last step involves continuous flow cryogenic conditions**
- **Invented and developed a process to manufacture a new health supplement based on nicotinamide riboside (Niagen®). As of 2019 this product has taken off in the supplement market.**
- **Guest reviewer for "Practical Process Research and Development" by Neal Anderson, Pergamon Press, 2012.**
- **Developed novel process for the homologation of amino acid derivatives.**
- **Conceived and developed a novel route to a specialty amino acid. As of 2012 this had netted Synthetech / Grace > $3M in revenues.**
- **Invented novel protocol for methylidene transfer epoxidation. (see D C Forbes, Michael C Standen, D L Lewis, Organic Letters (2003), 5(13), 2283-2286).** *Instigated collaboration with a local academic to facilitate and progress this project.*
- **Development of alternative process for manufacture of an organophosphorus herbicide resulting in potential savings of $5M in materials and $19M in capital.**
- **Developed a process for manufacture of a heterocyclic intermediate for a new product. This work included identification of a safe, robust, operable, commercially viable and environmentally acceptable process. The process has been patented.**
- **Led a team of chemists in the development of a process for a new fungicide (picoxystrobin) was launched in 2001. Carried out initial route generation and screening for this material and supervised the initial pilot plant manufactures.**
- **UK government funded collaboration with 2 university groups led to new methodologies which were both patented and published and one featured in a C&E news article**
- **Invented and patented an improved process for the manufacture of benzodifuranone disperse dyes translating to estimated materials savings of $3M per year.**

- **Developed and patented a highly regioselective one stage synthesis of 4,4'-difluorobenophenone from fluorobenzene.**

ANALYTICAL EXPERIENCE

Have extensive analytical/characterization experience including the following techniques:- NMR, IR, UV/Vis, GC, GC/MS, HPLC, IC, DSC, and XRD

EDUCATION

University of Manchester, England 1979-1985.

B.Sc. (Honors) in Chemistry 1982.

M.Sc. in Organic Photochemistry 1983.

Ph.D. in Organic Chemistry 1985.

REFERENCES

Available upon request

AWARDS

1. Fulbright Scholarship for Research at University of Texas, 1986-87.
2. Valliscor LLC:- 2015 Oregon Manufacturer of the Year (<10 employees)
3. Corvallis Chamber of Commerce Entrepreneurs of the Year award for 2015

Publication List

1. Crystalline form of Nicotinamide Riboside, Erik C. Carlson, **Michael C. Standen** and Westin C. Morrill. WO 2016014927 A3.
2. Process for the Preparation of (S)-2-Amino-5-cyclopropyl-4,4-difluoropentanoic Acid and Alkyl Esters and Acid Salts Thereof, Barry Hart, Jeff Dener, Michael Green, **Michael C. Standen**, Oldrich Kocian: US 8,324,417, 2012
3. S-Methylidene Agents: Preparation of Chiral non-Racemic Heterocycles. D C Forbes, S Bettigeri, S Patrawala, S Pischek, **Michael C Standen**, Tetrahedron (2008), 2009, 65(1), 70-76.
4. Aryl-Substituted Sulfonium Betaines: Preparation and Use in the Epoxidation of Aldehydes . D C Forbes, S Amin, C J Bean, **Michael C Standen**, Journal of Organic Chemistry (2006), 71(21), 8287-8290.
5. Sulfur Ylides via Decarboxylation of Carboxymethylsulfonium Betaines: A Novel and Mild Protocol for the Preparation of Oxiranes. D C Forbes, **Michael C Standen**, D L Lewis, Organic Letters (2003), 5(13), 2283-2286.
6. Preparation of Diazapentalene Derivatives via Epoxidation of Dihydropyrroles. By Quibell, Martin; Wang, Yikang; Nally, James; Watts, John Paul; Aggarwal, Virendar Kumar; **Standen, Michael**; PCT Int. Appl. (2007), WO 2007017698 A1 20070215.
7. Solution Phase Synthesis of Peptides and Peptide Building Blocks: Some Considerations for Process Scale Up. **Michael C Standen**, Specialty Chemicals Magazine, Oct 2002.
8. Synthesis of Chlorinated Pyrimidines. T J Doyle, P K Wehrenberg, **Michael C Standen**, PCT Int. Appl. (2002), WO 2002000628 A2 20020103.
9. Direct Asymmetric Epoxidation of Aldehydes Using Catalytic Amounts of Enantiomerically Pure Sulfides. V K Aggarwal, J G Ford, A Thompson, R V H Jones, **Michael C Standen**, Edited by H Werner, and P Schreier. From Selective Reactions of Metal-Activated Molecules, Proceedings of the Symposium, 3rd, Wuerzburg, Germany, Sept. 17-19, 1997 (1998), 13-24.
10. Chlorination Process for the Preparation of 4,6-dichloropyrimidine from 4,6-Dihydroxypyrimidine using Dichlorophosphorane Chlorinating Agents. A J Whitton, E C Boyd, **Michael C Standen**, P K Wehrenberg, R V H Jones, T J Doyle, D A Glanville. U.S. (2000), US 6160117 A 20001212.
11. Asymmetric Ethylmagnesiation of Alkenes Using a Novel Zirconium Catalyst. L Bell, D C Brookings, G Dawson, R J Whitby, R V H Jones, **Michael C Standen**. Tetrahedron (1998), 54(48), 14617-14634.

12. Preparation of 2-Mercaptothiazole from a Dithiocarbamic acid salt and a Haloacetaldehyde. S Fitzjohn, **Michael C Standen**, S M Brown, P K Wehrenberg, From PCT Int. Appl. (1998), WO 9837074 A1 19980827.
13. Preparation of 3-Isochromanone. R V H Jones, **Michael C Standen**, A G Williams, N R Foster, From PCT Int. Appl. (1997), WO 9748692 A1 19971224.
14. Preparation of Methyl [2-(chloro- or bromomethyl)phenyl]acetates by the Reaction of 3-Isochromanone with Methanol and Thionyl Chloride or Bromide. R V H Jones, D J Ritchie, H S R McCann, **Michael C Standen**. PCT Int. Appl. (1997), WO 9748671 A1 19971224.
15. Catalytic and Asymmetric Aziridination using Sulfur Ylides. V K Aggarwal, A Thompson, R V H Jones, **Michael C Standen**. Phosphorus, Sulfur and Silicon and the Related Elements (1997), 120 & 121, 361-362.
16. Preparation of 2-(6-substituted 2-pyridyloxymethyl)phenylacetates as Intermediates for Agrochemical Fungicides. P A Worthington, G R Munns, R V H Jones, Michael C Standen, D J Ritchie, J Forrester. PCT Int. Appl. (1997), WO 9701538 A1 19970116.
17. Novel Catalytic and Asymmetric Process for Aziridination Mediated by Sulfur Ylides. V K Aggarwal, A Thompson, R V H Jones, **Michael C Standen**. Journal of Organic Chemistry (1996), 61(24), 8368-8369.
18. Catalytic Asymmetric Carbomagnesiation of Unactivated Alkenes. A new, effective, active, cheap and recoverable chiral zirconocene. L Bell, R J Whitby, R V H Jones, **Michael C Standen**. Tetrahedron Letters (1996), 37(39), 7139-7142.
19. Chiral Organometallic Compounds. R V H Jones, **Michael C Standen**, R J Whitby, L Bell. PCT Int. Appl. (1996), WO 9625420 A1 19960822.
20. A novel Catalytic Cycle for the Synthesis of Epoxides Using Sulfur Ylides. V K Aggarwal, H Abdel-Rahman, L Fan, R V H Jones, **Michael C Standen**. Chemistry--A European Journal (1996), 2(8), 1024-1030.
21. Direct Asymmetric Epoxidation of Aldehydes Using Catalytic Amounts of Enantiomerically Pure Sulfides. V k Aggarwal, G J Ford, A Thompson, R V H Jones, **Michael C Standen**. Journal of the American Chemical Society (1996), 118(29), 7004-7005.
22. Preparation of a [(pyrimidinyloxy)phenyl]bis(methoxy)propanoate. M C Bowden, S M Brown, R V H Jones, **Michael C Standen**, C J Urch. Ger. Offen. (1996), DE 19525393 A1 19960201.
23. Process and Catalysts for the Preparation of Benzothiophenones and benzophenones from thiophosgene and substituted benzenes. **Michael C Standen**, N C Evens. PCT Int. Appl. (1995), WO 9531435 A1 19951123.

24. The use of Chiral Sulfides in Catalytic Asymmetric Epoxidation. V k Aggarwal, A Thompson, R V H Jones, **Michael C Standen**. Tetrahedron: Asymmetry (1995), 6(10), 2557-64.
25. A novel Catalytic Cycle for the Synthesis of Epoxides using Sulfur Ylides: Application to Base Sensitive Aldehydes. V K Aggarwal, H Abdel-Rahman, R V H Jones, **Michael C Standen**. Tetrahedron Letters (1995), 36(10), 1731-2.
26. Process for the Manufacture of N-phosphonomethyliminodiacetic acid. R V H Jones, **Michael C Standen**, G A Rae, D J Ritchie. PCT Int. Appl. (1994), WO 9415939 A1 19940721.
27. Manufacture of Polycyclic Dye Intermediates. Michael C Standen. Eur. Pat. Appl. (1993), EP 560499 A1 19930915.
28. Preparation of Aminodiphenylbenzodifurandione Dyes, and Intermediates therein. N Hall, **Michael C Standen**. Eur. Pat. Appl. (1993), EP 575056 A1 19931222.
29. The Pyrolysis of Fluorocarbons. P.L. Coe, R.G. Plevey and **M.C. Standen**. J. Fluorine Chem. Vol45, No. 1 p 112.
30. Synthesis of Perdeutero-1,4-diazabicyclo[2.2.2]octane (DABCO-2H12). A A Gorman, **Michael C Standen**. Journal of Labelled Compounds and Radiopharmaceuticals (1988), 25(9), 939-42.
31. Identification of Both Pre-Equilibrium and Diffusion Limits for Reaction of Singlet Oxygen, $O_2(1\Delta g)$, with Both Physical and Chemical Quenchers: Variable-Temperature, Time-Resolved Infrared Luminescence Studies. A A Gorman, I Hamblett, C Lambert, B Spencer, **Michael C Standen**. Journal of the American Chemical Society (1988), 110(24), 8053-9.
32. The Mechanism of Reaction of Singlet Oxygen, 1Δg, with Vitamin E. A A Gorman, I Hamblett and **Michael C Standen**. NATO ASI Series, Series A: Life Sciences (1985), 85 (Primary Photo-Processes Biol. Med.), 201-3.
33. Pulse Radiolysis Study of the Cycloheptatriene Triplet State: Lifetime, Relaxation and non-Vertical Excitation. A A Gorman, I Hamblett, M Irvine, P Raby, **Michael C Standen**, S Yeates. Journal of the American Chemical Society (1985), 107(15), 4404-11.
34. Reversible Exciplex Formation Between Singlet Oxygen, 1Δg, and Vitamin E. Solvent and Temperature Effects. A A Gorman, I R Gould, I Hamblett, **Michael C Standen**. Journal of the American Chemical Society (1984), 106(23), 6956-9.
35. Strychnine: A Fast, Physical Quencher of Singlet Oxygen (1Δg). A A Gorman, I Hamblett, K Smith, **Michael C Standen**. Tetrahedron Letters (1984), 25(5), 581-4.