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CARLOS A. CARRERO

EDUCATION

2012 Ph.D., Natural Science: Chemistry, Technical University of Berlin, Berlin, Germany.

2006 Msc., Natural Science: Chemistry, Universidad de los Andes, Merida, Venezuela.

EXPERIENCE

August 2016 – PRESENT: **Assistant Professor**, Auburn University, Auburn, USA.

2014 – 2016: **Postdoctoral Researcher**, *University of Wisconsin-Madison*, Madison, USA.

2013 – 2014: **Postdoctoral Researcher,** Max Planck Institute for Chemical Energy Conversion, Muelheim an der Ruhr, Germany.

2006 – 2008: **Junior Researcher I**, PDVSA-INTEVEP, Los Teques, Venezuela.

International Guest and Collaborations:

Kinetic studies of Supported Metal Oxides
Firtz Habert Institute, Berlin, Germany (March 2010 – July 2012)

Electron Paramagnetic Resonance Spectroscopy (EPR)
Free University of Berlin (January 2009 – July 2012)

In situ Optical Spectroscopy (Raman, UV-vis, IR)
Lehigh University, Bethlehem, Pennsylvania (July – September 2010)

High Frequency Electron Paramagnetic Resonance (HF-EPR)
National High Magnetic Field Laboratory (May – Jun 2012)

High Resolution Transmission Electron Microscopy (HR-TEM)
Universidad Autonoma de Mexico, DF-Mexico, (March – April 2008)

TEACHING EXPERIENCE

2016 - Present: Introduction to Thermodynamics, Fluid dynamics, and Heat Transfer
Department of Chemical Engineering, Auburn University
2014 – 2016: Industrial Catalysis – as collaborator
Department of Chemistry, University of Wisconsin-Madison
2009 – 2012: Reaction Kinetics – as collaborator
Department of Applied Chemistry, Technical University of Berlin

AWARDS, MEMBERSHIPS AND SERVICE

- **Young Scientist Prize**, 16th ICC Catalysis, Beijing, China. 2016
- **Mentor Award,** Chemistry Department at UW Madison. 2015
- **PhD Fellowship** at the Berlin International School of Natural Sciences and Engineering (BIG-NSE). http://www.big-nse.tu-berlin.de/index.php?id=334 (2008 – 2012)

- **DAAD Scholarship**: Germany PhD program (2008-2012)
- **Member, American Chemical Society** (2014 – present)
- **Member, American Institute of Chemical Engineers** (2014 – present)
- **Journal reviewing activities**: Catalysis Science and Technology, Chemical Society Reviews, RSC Advances, Applied Catalysis A, Applied Catalysis B (2012 – present)
- **Committee member:** PhD program, Antioquia University, Colombia (2013-present)
- **Member:** Latino Professional Association, Madison Wisconsin (2012 – 2014)

SELECTED PUBLICATIONS AND PATENTS

1) **C. A. Carrero**, S. P. Burt, F. Huang, J. M. Venegas, A. M. Love, P. Mueller, H. Zhu, J. T. Grant, R. Mathison, M. Hanrahan, A. Rossini, M. Ball, J. Dumesic, I. Hermans, *Supported two- and three-dimensional vanadium oxide species on the surface of β-SiC.* **Catal. Sci. Technol**. (2017) "submitted"

2) D. Casas, E. Alarcón, C. A. Carrero, J. M. Venegas, W. McDermott, E. Klosterman, I. Hermans, A. Villa, *The Influence of Tin Loading and Pore Size of Sn/MCM-41 Catalysts on the Synthesis of Nopol.* **Ind. Eng. Chem. Res.** (2017) "submitted"

3) J. M. Venegas, J. T. Grant, W. P. McDermott, S. P. Burt, J. Micka, **C. A. Carrero**, I. Hermans, *Selective oxidation of n-butane and iso-butane catalyzed by boron nitride.* **ChemCatChem** (2017) DOI:10.1002/cctc.201601686

4) J. T. Grant, **C. A. Carrero**, F. Goeltl, J. Venegas, P. Mueller, S. P. Burt, S. E. Specht, W. P. McDermott, A. Chieregato, I. Hermans, *Selective oxidative dehydrogenation of propane to propene using boron nitride catalysts.* **Science** (2016) DOI: 10.1126/science.aaf7885

5) Joseph T. Grant, Alyssa M. Love1, **Carlos A. Carrero**, Fangying Huang, Jesse Panger, Rene Verel, Ive Hermans, *Improved Supported Metal Oxides for the Oxidative Dehydrogenation of Propane.* **Topics in Catal.** 59 (2016) 1545

6) X. Zhuoran, J. Chada, **C. A. Carrero**, D. Zhao, Y. T. Kim, D. Rosenfeld, S. Rozeveld, I. Hermans, G. W. Huber, *Production of Linear Octenes from Oligomerization of 1-Butene over Carbon-Supported Cobalt Catalysts*. **ACS Catalysis** 6 (2016) 3815

7) J. T. Grant, **C. A. Carrero**, I. Hermans, *Enhanced dispersion of two-dimensional metal oxide surface species on silica using sodium as promoter.* **Patent application number: 62/112,689**. United States of America, Issued date: February 2015.

8) J. T. Grant, **C. A. Carrero**, I. Hermans, *Heterogeneous Catalysis for the Oxidative Dehydrogenation of alkanes.* **Patent application number: 62/215,879**. United States of America, Issued date: September 2015.

9) J. T. Grant, **C. A. Carrero**, A. M. Love, R. Verel, I. Hermans, *Enhanced two-dimensional dispersion of group V metal oxides on silica.* **ACS Catalysis** 5 (2015) 5787 (most downloaded paper, selected as cover journal - issue 10, editor choice paper)

10) R. Carrasquillo-Flores, I. Ro, M. D. Kumbhalkar, S. Burt, **C. A. Carrero,** A. C. Alba-Rubio, J. T. Miller, I. Hermans, G. W. Huber, J. A. Dumesic, *Reverse Water–Gas Shift on Interfacial Sites Formed by Deposition of Oxidized Molybdenum Moieties onto Gold Nanoparticles,* **J. Am. Chem. Soc.** 137 (2015) 10317

11) J. Lee, S. Burt, **C. A. Carrero**, A. Rubio, A. Carolina, R. Insoo; B. O'Neill, H. J. Kim, D. Jackson, T. Kuech, I. Hermans, J. A. Dumesic, G. W. Huber, *Stabilizing Cobalt Catalysts for Aqueous-Phase Reactions by Strong Metal-Support Interaction,* **J. Catal.** 330 (2015) 19 (2nd most downloaded paper)

12) **C. A. Carrero**, R. Schloegl, I. Wachs, R. Schomaecker, *A critical literature review of the kinetics for oxidative dehydrogenation of propane over supported vanadium oxide catalysts.* **ACS Catalysis** 4 (2014) 3357

13) **C. A. Carrero**, C. J. Keturakis, A. Orrego, R. Schomaecker, Israel E. Wachs, *Anomalous reactivity of supported V_2O_5 nanoparticles for propane oxidative dehydrogenation: influence of the vanadium oxide precursor.* **Dalton Trans**., 42 (2013) 12644

14) A. Dinse, T.Wolfram, **C. A. Carrero**, R. Schlögl, R. Schomäcker, K.-P. Dinse. *Exploring the Structure of Paramagnetic Centers in SBA-15 Supported Vanadia Catalysts with Pulsed One- and Two-Dimensional Electron Paramagnetic Resonance (EPR) and Electron Nuclear Double Resonance (ENDOR).* **J. Phys. Chem. C** 117 (2013) 16921

15) **C. A. Carrero**, M. Krauer, A. Dinse, T. Wolfram, N. Hamilton, A. Trunschke, R. Schloegl, R. Schomaecker, *High performance $(VO_x)_m$-$(TiO_y)_n$/SBA-15 Catalyst for the Oxidative Dehydrogenation of Propane.* **Catal. Sci. Technol**. 2 (2012) 1346

16) N. Hamilton, T. Wolfram, G. Tzolova-Müller, M. Haevecker, J. Krönnert, **C. A. Carrero**, R. Schomäcker, A. Trusnchke, R. Schölgl. *Topology of silica supported vanadium-titanium oxide catalysts for oxidative dehydrogenation of propane*. **Catal. Sci. Technol**. 2 (2012) 1346 (selected as cover journal, issue 7)

17) B. Beck, M. Harth, N. Hamilton, **C. A. Carrero**, J. Uhlrich, A. Trunschke, S. Shaikhutdinov, H. Schubert, H. J. Freund, R. Schlögl, J. Sauer, R. Schomäcker. *Scaling relations in the partial oxidation of ethanol on vanadia based catalysts.* **J. Catal.** 296 (2012) 120

18) A. Dinse, **C. A. Carrero**, T. Wolfram, A. Ozarowski, R. Schomäcker, R. Schlögl, K. P. Dinse. *Characterization and Quantification of Reduced Sites on Supported Vanadium Oxide Catalysts using High-Frequency EPR*. **Chem Cat Chem. 4 (**2012) 641 (selected as cover journal, issue 5)

SELECTED ORAL AND POSTER PRESENTATIONS

1) AIChE Annual Meeting (November 2017), Minneapolis, Minnesota, USA
Invited Speaker: A Synopsis of the Production of Propylene Via Oxidative Dehydrogenation of Propane: How Far from Its Commercial Implementation?

2) 8th World Congress on Oxidation Catalysis (September 2017), Krakow, Poland
Oral: Supported two- and three-dimensional vanadium oxide species (VOx) on the surface of VO_x/β-SiC

3) EUROPACAT (August 2017) Florence, Italy
Oral: New supported VO_x/β-SiC catalysts at sub- and mono-layer coverage for the partial oxidation of light hydrocarbons

4) 25th NAM (June 2017), Denver, Colorado, USA
Poster: Supported two- and three-dimensional vanadium oxide species on the surface of β-SiC

5) 252nd ACS National Meeting & Exposition (August 2016), Washington DC, USA
Invited Speaker: Binary and ternary supported metal oxide catalysts for propane activation: Synergistic effects, alkali promoters and highly thermal conductive materials to boost productivity toward propylene

6) 16th ICC2016, International Congress on Catalysis (July 2016), Beijing, China
Oral: Supported metal oxide catalysts for natural gas upgrading: Synergistic effects at sub-monolayer coverage to boost productivity toward olefins

7) AIChE Annual Meeting (November 2015), Salt Lake City, Utah, USA
Oral: Supported Transition Metal Oxide Catalysts at Monolayer Coverage for Natural Gas Upgrading
Poster (session: meet the faculty candidate): Heterogeneous Catalysis: Synthesis and Spectroscopy of Supported Metal Oxide Catalysts for Natural Gas Upgrading

8) 24th NAM (June 2015), Pittsburg, Pennsylvania, USA
Poster: Synthesis of olefins on mixed metal oxide catalysts via gaseous alkanes ODH

9) World Congress and Expo on Nanotechnology and Materials Science (April 2015), Dubai
Invited Speaker: Chemicals from crude oil, natural gas and biomass using nanocatalysis

10) 250th ACS National Meeting & Exposition (August 2015), Boston, USA
Oral: Enhanced dispersion of two-dimensional metal oxide surface species on SiO_2 using Na^+ as promoter

11) 249th ACS National Meeting & Exposition (March 2015), Denver, USA
Oral: Supported mixed metal oxide catalysts for natural gas upgrading

12) XXIV Congreso Iberoamericano de Catálisis (September 2014) Medellin, Colombia
Poster: Exploring the influence of the support in vanadium oxide catalysts for partial oxidation of light alkanes – (presented in Spanish)

13) University of Wisconsin-Madison, Department of Chemistry (May 2014) Madison, USA
Invited Speaker: Natural gas upgrading on supported metal oxide catalysts

14) University of Antioquia, Department of Chemistry (May 2012), Medellin, Colombia
Invited Speaker: Synthesis and characterization of ternary $(VO_x)_n$-$(TiO_x)_n$/SBA15 catalysts

15) Molybdenum & Vanadium symposium at Fritz Haber Institute, Max Planck Society Reactivity group (January 2011), Berlin, Germany
Oral: Kinetics study and state of the art of ternary $(VO_x)_n$-$(TiO_x)_n$/SBA15 catalyst

16) Technical University of Berlin, Department of Chemistry, UNICAT committee (January 2009), Berlin, Germany
Oral: Support and promoter effects in Propane ODH. A kinetic study.

17) EUROPACAT (August 2011) Glasgow, Scotland
Poster: Kinetic study of the oxidative dehydrogenation of propane (ODP) on promising model catalysts type $(VO_x)_n$-$(TiO_x)_n$/SBA-15

18) Weimar Catalysis Workshop (March 2011) Weimar, Germany
Poster: Influence of crystalline V_2O_5 nanoparticles on oxidative dehydrogenation of propane over supported vanadium oxide catalysts

19) Erkner International Symposium (February 2011) Erkner, Germany
Poster: Kinetics of oxidative dehydrogenation of propane over $(VO_x)_n$-$(TiO_x)_n$/SBA-15 catalysts. "Looking for the optimal V/Ti ratio" – (presented in German)

20) Novel Gas Conversion Symposium (NGCS09) (May 2010) Lyon, France
Poster-1: VO_x/SBA-15 and $(VO_x)_n$-$(TiO_x)_n$/SBA-15 catalysts in Oxidative Dehydrogenation of Propane (ODP): A critical review and kinetic study
Poster-2: Oxygen defect formation in VO_x-catalysts – a support effect

21) Weimar Catalysis Workshop (March 2010) Weimar, Germany
Poster: Vanadium and titanium oxides on SBA-15 as model catalyst for the Oxidative Dehydrogenation of Propane