

Curriculum Vitae

Matthew W. Kanan

Associate Professor of Chemistry
Stanford University
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EDUCATION

2000-2005: Harvard University
Ph.D. Organic Chemistry
National Science Foundation Graduate Research Fellow
DNA-Templated Synthesis and Reaction Discovery
1996-2000: Rice University
B.A. Chemistry, *Summa Cum Laude, Phi Beta Kappa*

PROFESSIONAL EXPERIENCE

2017–present: Stanford University
Associate Professor, Department of Chemistry
Senior Fellow, Precourt Institute for Energy
2009–2017: Stanford University
Assistant Professor of Chemistry
2005-2009: Massachusetts Institute of Technology
National Institutes of Health Postdoctoral Research Fellow
Water-Oxidation Catalysis

HONORS

2016: Camille and Henry Dreyfus Environmental Mentor
2015: Selected as one of first annual *Chemistry & Engineering News* Talented 12
2014: Camille Dreyfus Teacher-Scholar Award
2013: Hellman Faculty Scholar Award
2012: Camille and Henry Dreyfus Environmental Mentor
2010: Thieme Journal Award
2009: Eli Lilly New Faculty Award

PUBLICATIONS

(* indicates corresponding author)

21. “Editorial Overview: Seeds for a Bioenergy Future” MW Kanan* *Curr. Opin. Chem. Biol.* **2017**, *41*, A1–A2.

20. "Selective Increase in CO₂ Electroreduction Activity at Grain Boundary Surface Terminations" RG Mariano, K McKelvey, HS White, MW Kanan* *Science* **2017**, *358*, 1187–1192.
19. "Imaging the Hydrogen Absorption Dynamics of Individual Grains in Polycrystalline Palladium Thin Films in 3D" A Yau, RJ Harder, MW Kanan, A Ulvestad* *ACS Nano* **2017**, *11*, 10945–10954.
18. "A Scalable Carboxylation Route to Furan-2,5-Dicarboxylic Acid" GR Dick, AD Frankhouser, A Banerjee, MW Kanan* *Green Chem.* **2017**, *19*, 2966–2972.
17. "Bragg Coherent Diffractive Imaging of Single-Grain Defect Dynamics in Polycrystalline Films" A Yau, W Cha, MW Kanan, GB Stephenson*, A Ulvestad* *Science* **2017**, *356*, 739–742.
16. "Electrostatic Control of Regioselectivity in Au(I)-Catalyzed Hydroarylation" VM Lau, WC Pfalzgraff, TE Markland, MW Kanan* *J. Am. Chem. Soc.* **2017**, *139*, 4035–4041.
15. "Molecular Catalysis at Polarized Interfaces Created by Ferroelectric BaTiO₃" ES Beh, SA Basun, X Feng, IU Idehenre, DR Evans, MW Kanan* *Chem. Sci.* **2017**, *8*, 2790–2794.
14. "A Direct Grain Boundary–Activity Correlation for CO Electroreduction on Cu Nanoparticles" X Feng, K Jiang, S Fan, MW Kanan* *ACS Cent. Sci.* **2016**, *2*, 169–174.
13. "Carbon Dioxide Utilization via Carbonate-Promoted C–H Carboxylation" A Banerjee, GR Dick, T Yoshino, MW Kanan* *Nature* **2016**, *531*, 215–219.
12. "Probing the Active Surface Sites for CO Reduction on Oxide-Derived Copper Electrocatalysts" A Verdaguer-Casadevall, CW Li, TP Johansson, SB Scott, JT McKeown, M Kumar, IEL Stephens, MW Kanan*, I Chorkendorff* *J. Am. Chem. Soc.* **2015**, *137*, 9808–9811.
11. "Grain Boundary–Dependent CO₂ Reduction Activity" X Feng, K Jiang, S Fan, MW Kanan* *J. Am. Chem. Soc.* **2015**, *137*, 4606–4609.
10. "Pd-Catalyzed Electrochemical Conversion of Carbon Dioxide to Formate: High Mass Activity at Minimal Overpotential and Identification of the Deactivation Pathway" X Min, MW Kanan* *J. Am. Chem. Soc.* **2015**, *137*, 4701–4708.
9. "Controlling H⁺ vs CO₂ Reduction Selectivity on Pb Electrodes" CH Lee, MW Kanan* *ACS Catal.* **2015**, *5*, 465–469.
8. "Electrostatic Control of Regioselectivity via Ion Pairing in a Au(I)-Catalyzed Rearrangement" VM Lau, CF Gorin, MW Kanan* *Chem. Sci.* **2014**, *5*, 4975–4979.
7. "Alkaline O₂ Reduction on Oxide-Derived Au: High Activity and 4e⁻ Selectivity without (100) Facets" X Min, Y Chen, MW Kanan* *Phys. Chem. Chem. Phys.* **2014** *16*, 13601–13604.
6. "Electroreduction of Carbon Monoxide to Liquid Fuel on Oxide-Derived Nanocrystalline Copper" CW Li, J Ciston, MW Kanan* *Nature* **2014**, *508*, 504–507.
5. "Interfacial Electric Field Effects on a Carbene Reaction Catalyzed by Rh Porphyrins" CF Gorin, ES Beh, QM Bui, GR Dick, MW Kanan* *J. Am. Chem. Soc.* **2013**, *135*, 11257–11265.
4. "Aqueous CO₂ Reduction at Very Low Overpotential on Oxide-Derived Au Nanoparticles" Y Chen, CW Li, MW Kanan* *J. Am. Chem. Soc.* **2012**, *134*, 19969–19972.
3. "CO₂ Reduction at Low Overpotential on Cu Electrodes Resulting from the Reduction of Thick Cu₂O Films" CW Li, MW Kanan* *J. Am. Chem. Soc.* **2012**, *134*, 7231–7234.

2. "Tin Oxide Dependence of the CO₂ Reduction Efficiency on Tin Electrodes and Enhanced Activity for Tin/Tin Oxide Thin-Film Catalysts" Y Chen, MW Kanan* *J. Am. Chem. Soc.* **2012**, *134*, 1986–1989.

1. "An Electric Field-Induced Change in the Selectivity of a Metal Oxide-Catalyzed Epoxide Rearrangement" CF Gorin, ES Beh, MW Kanan* *J. Am. Chem. Soc.* **2012**, *134*, 186–189.

Postdoctoral and Graduate Work

10. "Mechanistic Studies of the Oxygen Evolution Reaction by a Cobalt-Phosphate Catalyst at Neutral pH" Y Surendranath, MW Kanan, DG Nocera* *J. Am. Chem. Soc.* **2010**, *132*, 16501–16509.

9. "Structure and Valency of a Cobalt-Phosphate Water Oxidation Catalyst Determined by In Situ X-ray Spectroscopy" MW Kanan, J Yano, Y Surendranath, M Dincă, VK Yachandra*, DG Nocera* *J. Am. Chem. Soc.* **2010**, *132*, 13692–13701.

8. "Cobalt-Phosphate Oxygen Evolving Compound" MW Kanan, Y Surendranath, DG Nocera* *Chem. Soc. Rev.* **2009**, *38*, 109–114.

7. "In Situ Formation of an Oxygen-Evolving Catalyst in Neutral Water Containing Phosphate and Co²⁺" MW Kanan, DG Nocera* *Science* **2008**, *321*, 1072–1075.

6. "Development and Initial Application of a Hybridization-Independent, DNA-Encoded Reaction Discovery System Compatible with Organic Solvents" MM Rozenman, MW Kanan, DR Liu* *J. Am. Chem. Soc.* **2007**, *129*, 14933–14938.

5. "Synthesis of Acyclic α,β -Unsaturated Ketones Via Pd(II)-Catalyzed Intermolecular Reaction of Alkynamides and Alkenes" N Momiyama, MW Kanan, DR Liu* *J. Am. Chem. Soc.* **2007**, *129*, 2230–2231.

4. "Reaction Discovery Enabled by DNA-Templated Synthesis and In Vitro Selection" MW Kanan, MM Rozenman, K Sakurai, TM Snyder, DR Liu* *Nature* **2004**, *431*, 545–549.

3. "Multi-Step Small-Molecule Synthesis Programmed by DNA Templates" ZJ Gartner, MW Kanan, DR Liu* *J. Am. Chem. Soc.* **2002**, *124*, 10304–10306.

2. "Expanding the Reaction Scope of DNA-Templated Synthesis" ZJ Gartner, MW Kanan, DR Liu* *Angew. Chem. Int. Ed.* **2002**, *41*, 1796–1800.

1. "Facile Synthesis of a Fluorescent Deoxycytidine Analogue Suitable for Probing the RecA Nucleoprotein Filament" SF Singleton*, F Shan, MW Kanan, CM McIntosh, CJ Stearman, JS Helm, KJ Webb *Org. Lett.* **2001**, *3*, 3919–3922.

ISSUED PATENTS AND PATENT APPLICATIONS

Issued Patents

"Rapid Small-Volume Detection of Blood Ammonia" TR Veltman, C Tsai, MW Kanan, G Chu US Patent 9,625,443 (2017).

"Catalysts for Low Temperature Electrolytic CO₂ or CO Reduction" CW Li, Y Chen, MW Kanan US Patent 9,255,355 (2016).

"Palladium-Catalyzed Carbon-Carbon Bond-Forming Reactions" DR Liu, MW Kanan, MM Rozenman US Patent 7,851,658 (2010).

“Evolving New Molecular Function” DR Liu, ZJ Gartner, MW Kanan US Patent 7,070,928 (2006).

Patent Applications

“Carbonate-Promoted Carboxylation Reactions for the Synthesis of Valuable Organic Compounds” MW Kanan, A Banerjee US Patent Application 62/136,288 (2015).

SERVICE

2018: Committee Member for National Academy of Science study on Developing a Research Agenda for Utilization of Gaseous Carbon Waste Streams

2017: Guest Editor for the Energy Section of *Current Opinion in Chemical Biology*

2016–present: Director of Stanford Chemistry Summer Undergraduate Research Program

2017: Panelist for the Department of Energy Basic Research Needs Workshop in Catalysis Science

2015–2017: Organizing Committee Member for the Joint US–Israeli Kavli Frontiers of Science Symposia

2015–present: Editorial Advisory Board Member, *ACS Central Science*