

## The Electrocatalysis Consortium (ElectroCat)

### Publications

2016- May, 2023

1. "Performance investigation of alkaline direct methanol fuel cell with commercial PGM-free cathodic materials", C.L. Vecchio, X. Lyu, I. Gatto, B. Zulevi, A. Serov, V. Baglio *Journal of Power Sources* **561** (2023) 232732.
2. "Iron redox behavior and oxygen reduction activity of Fe-N-C electrocatalysts in different electrolytes", X. Wang, M. Ferrandon, J. H. Park, J.-J. Shen, A. J. Kropf, H. Zhang, P. Zelenay, D.J. Myers, *Electrochimica Acta* **443** (2023) 141934.
3. "Adaptive learning-driven high-throughput synthesis of oxygen reduction reaction Fe-N-C electrocatalysts", W.J.M. Kort-Kamp, M. Ferrandon, X. Wang, J.H. Park, R.K. Malla, T. Ahmed, E.F. Holby, D.J. Myers, P. Zelenay, *Journal of Power Sources* **559** (2023) 232583.
4. "Enhancing the activity of Fe-N-C oxygen reduction reaction electrocatalysts by high-throughput exploration of synthesis parameters", M.S. Ferrandon, J.H. Park, X. Wang, E. Coleman, A.J. Kropf, D.J. Myers, *Electrochimica Acta* **441** (2023) 141850.
5. "La-Sr-Co Oxide Catalysts for Oxygen Evolution Reaction in Anion Exchange Membrane Water Electrolyzer: The Role of Electrode Fabrication on Performance and Durability", L. Osmieri, Y. He, H. T. Chung, G. McCool, B. Zulevi, D. A. Cullen, and P. Zelenay, *Journal of Power Sources* **556** (2023) 232484.
6. "Anion Exchange Membrane Water Electrolysis: The Future of Green Hydrogen", Q. Li, A. M. Villarino, C. R. Peltier, A. J. Macbeth, Y. Yang, M. J. Kim, Z. Shi, M. R. Krumov, C. Lei, G. Rodríguez-Calero, J. Soto, S. H. Yu, P. F. Mutolo, L. Xiao, L. Zhuang, D. A. Muller, G. W. Coates, P. Zelenay, H. D. Abruña, *Journal of Physical Chemistry C* **127**, 17 (2023) 7901.
7. "Design of PGM-free Cathodic Catalyst Layers for Advanced PEM Fuel Cells", T. Reshetyenko, M. Odgaard, G. Randolph, K. K. Ohtaki, J. P. Bradley, B. Zulevi, X. Lyu, D. A. Cullen, C. J. Jafta, A. Serov, A. Kulikovskiy, *Applied Catalysis B: Environmental* **312** (2022) 121424.
8. "Mesoporous textured Fe-N-C electrocatalysts as highly efficient cathodes for proton exchange membrane fuel cells", S. Akula, M. Mooste, B. Zulevi, S. McKinney, A. Kikas, H.-M. Piirsoo, M. Rähn, A. Tamm, V. Kisand, A. Serov, E. B. Creel, D. A. Cullen, K. C. Neyerlin, H. Wang, M. Odgaard, T. Reshetyenko, K. Tammeveski *J. Power Sources* **520** (2022) 230819.
9. "Elucidating the impact of the ionomer equivalent weight on a platinum group metal-free PEMFC cathode via oxygen limiting current", H. Wang, L. Osmieri, H. Yu, M. J. Zachman, J. H. Park, N. N. Kariuki, F. C. Cetinbas, S. Khandavalli, S. Mauger, D. J. Myers, D. A. Cullen, K.C. Neyerlin, *SusMat* **3** (2022) 72.
10. "Atomically dispersed iron sites with a nitrogen-carbon coating as highly active and durable oxygen reduction catalysts for fuel cells", S. Liu, C. Li, M. J. Zachman, Y. Zeng, H. Yu, B. Li, M. Wang,

- J. Braaten, J. Liu, H.M. Meyer III, M. Lucero, A. J. Kropf, E.E. Alp, Q. Gong, Q. Shi, Z. Feng, G. Wang, H. Xu, D.J. Myers, J. Xie, D.A. Cullen, S. Litster, and G. Wu, *Nature Energy* **7** (2022) 652.
11. "Design of PGM-free Cathodic Catalyst Layers for Advanced PEM Fuel Cells", T. Reshетенko, M. Odgaard, G. Randolph, K.K. Ohtaki, J.P. Bradley, B. Zulevi, X. Lyu, D.A. Cullen, C. J. Jafta, A. Serov, A. Kulikovskiy, *Applied Catalysis B: Environmental* **312** (2022) 121424.
  12. "Electrocatalysis of Oxygen Reduction Reaction in Polymer Electrolyte Fuel Cell with Covalent Framework of Iron Phthalocyanine Aerogel," N. Zion, L. Peles-Strahl, A. Friedman, D.A. Cullen, L. Elbaz, *ACS Applied Materials and Interfaces* **14**, 18 (2022) 20303.
  13. "Standardized protocols for evaluating durability and performance of platinum group metal-free oxygen reduction reaction electrocatalysts in polymer electrolyte fuel cells", H. Zhang, L. Osmieri, J. H. Park, H. T. Chung, D. A. Cullen, K. C. Neyerlin, D. J. Myers, and P. Zelenay, *Nature Catalysis* **5** (2022) 1.
  14. "Quantifying the electrochemical active site density of precious metal-free catalysts in situ in fuel cells", R. Z. Snitkoff-Sol, A. Friedman, Y. Yurko, A. Kozhushner, M. J. Zachman, P. Zelenay, A. M. Bond, and L. Elbaz, *Nature Catalysis* **5** (2022) 163.
  15. "Electrocatalysis in Alkaline Media and Alkaline Membrane-Based Energy Technologies", Y. Yang, C. R. Peltier, R. Zeng, R. Schimmenti, Q. Li, Xin Huang, Z. Yan, G. Potsi, R. Selhorst, X. Lu, W. Xu, M. Tader, A. V. Soudackov, Ha. Zhang, M. Krumov, E. Murray, P. Xu, J. Hitt, L. Xu, H.-Y. Ko, B. G. Ernst, C. Bundschu, A. Luo, D. Markovich, M. Hu, C. He, H. Wang, J. Fang, R. A. DiStasio Jr., L. F. Kourkoutis, A. Singer, K. J. T. Noonan, L. Xiao, L. Zhuang, B. S. Pivovar, P. Zelenay, E. Herrero, J. M. Feliu, J. Suntivich, E. P. Giannelis, S. Hammes-Schiffer, T. Arias, M. Mavrikakis, T. E. Mallouk, J. D. Brock, D. A. Muller, F. J. DiSalvo, G. W. Coates, and H D. Abruña, *Chem. Rev.* **122** (2022) 6117.
  16. "Mesoporous textured Fe-NC electrocatalysts as highly efficient cathodes for proton exchange membrane fuel cells", S. Akula, M. Mooste, B. Zulevi, S. McKinney, A. Kikas, H.-M. Piirsoo, M. Rähn, A. Tamm, V. Kisand, A. Serov, E.B Creel, D. A. Cullen, K. C. Neyerlin, H. Wang, M. Odgaard, T. Reshетенko, and K. Tammeveski, *J. Power Sources* **520** (2022) 230819.
  17. "Elucidating fuel cell catalyst degradation mechanisms by identical-location transmission electron microscopy", H. Yu, M. Zachman, D. Myers, R. Mukundan, H. Zhang, P. Zelenay, K. Neyerlin, and D. Cullen, *Microsc. Microanal.* **27** (2021) 974.
  18. "Single Atomic Iron Site Catalysts via Benign Aqueous Synthesis for Durability Improvement in Proton Exchange Membrane Fuels Cells", M. Chen, D.A. Cullen, S. Karakalos, X. Lu, J. Cui, K. Jeremy, H. Mistry, K. He, D.J. Myers, and G. Wu, *J. Electrochem. Soc.* **168** (2021) 044501.
  19. "Chemical vapour deposition of Fe–N–C oxygen reduction catalysts with full utilization of dense Fe–N<sub>4</sub> sites", L. Jiao, J. Li, L. LaRochelle Richard, Q. Sun, T. Stracensky, E. Liu, M. Tahar Sougrati, Z. Zhao, F. Yang, S. Zhong, H. Xu, S. Mukerjee, Y. Huang, D. A. Cullen, J. H. Park, M. Ferrandon, D. J. Myers, F. Jaouen, and Q. Jia. *Nature Materials* **20** (2021) 1385.
  20. "Promoting Atomically Dispersed MnN<sub>4</sub> Sites via Sulfur Doping for Oxygen Reduction: Unveiling Intrinsic Activity and Degradation in Fuel Cells", L. Guo, S. Hwang, B. Li, F. Yang, M. Wang, M.

Chen, X. Yang, S. G. Karakalos, D. A. Cullen, Z. Feng, G. Wang, G. Wu, and H. Xu, *ACS Nano* **15** (2021) 6886.

21. "Porphyrin Aerogel Catalysts for Oxygen Reduction Reaction in Anion-Exchange Membrane Fuel Cells", N. Zion, J. C. Douglin, D. A. Cullen, P. Zelenay, D. R. Dekel, and L. Elbaz *Adv. Funct. Mater.* **31** (2021) 2100963.
22. "Stability of Atomically Dispersed Fe–N–C ORR Catalyst in Polymer Electrolyte Fuel Cell Environment", R. K. Ahluwalia, X. Wang, L. Osmieri, J-K Peng, C. F. Cetinbas, J. Park, D.J. Myers, H. T. Chung, and K. C. Neyerlin, *J. Electrochem. Soc.* **168** (2021) 024513.
23. "Dynamically Unveiling Metal-Nitrogen Coordination during Thermal Activation to Design High-Efficient Atomically Dispersed CoN<sub>4</sub> Active Sites", Y. He, Q. Shi, W. Shan, X. Li, A. J. Kropf, E. C. Wegener, J. Wright, S. Karakalos, D. Su, D. A. Cullen, G. Wang, D. J. Myers, and G. Wu, *Angew. Chem. Int. Ed.* **60** (2021) 9516.
24. "Detection Technologies for Reactive Oxygen Species: Fluorescence and Electrochemical Methods and Their Applications", S. Duanghathaipornsuk, E. J. Farrell, A. C. Alba-Rubio, P. Zelenay; D.-S. Kim, *Biosensors* **11** (2021) 30.
25. "Performance enhancement and degradation mechanism identification of a single-atom Co–N–C catalyst for proton exchange membrane fuel cells", X. Xie, C. He, B. Li, Y. He, D. A. Cullen, E. C. Wegener, A. J. Kropf, U. Martinez, Y. Cheng, M. H. Engelhard, M. E. Bowden, M. Song, T. Lemmon, X. S. Li, Z. Nie, J. Liu, D. J. Myers, P. Zelenay, G. Wang, G. Wu, V. Ramani, and Y. Shao, *Nature Catalysis* **3** (2020) 1044.
26. "Acid Stability and Demetalation of PGM-free ORR Electrocatalyst Structures from Density Functional Theory: A Model for "Single-Atom Catalyst" Dissolution", E. F. Holby, G. Wang, and P. Zelenay, *ACS Catal.* **10** (2020) 14527.
27. "Recent Progress in the Durability of Fe-N-C Oxygen Reduction Electrocatalysts for Polymer Electrolyte Fuel Cells", J. C. Weiss, H. Zhang, P. Zelenay, *J. Electroanal. Chem.* **875** (2020) 114696.
28. "Single Cobalt Sites Dispersed in Hierarchically Porous Nanofiber Networks for Durable and High-Power PGM-Free Cathodes in Fuel Cells", Y. He, H. Guo, S. Hwang, X. Yang, Z. He, J. Braaten, S. Karakalos, W. Shan, M. Wang, H. Zhou, Z. Feng, K. L. More, G. Wang, D. Su, D. A. Cullen, L. Fei, S. Litster, and G. Wu. *Adv. Mater.* **32** (2020), 202003577.
29. "On the Lack of Correlation between the Voltammetric Redox Couple and ORR Activity of Fe-N-C Catalysts", M. C. Elvington, H. T. Chung, L. Lin, X Yin, P. Ganesan, P. Zelenay, and H. R. Colón-Mercado, *J. Electrochem. Soc.* **167** (2020) 134510.
30. "Effect of Dispersion Medium Composition and Ionomer Concentration on the Microstructure and Rheology of Fe–N–C Platinum Group Metal-Free Catalyst Inks for Polymer Electrolyte Membrane Fuel Cells", S. Khandavalli, R. Iyer, J. H. Park, D. J. Myers, K. C. Neyerlin, M. Ulsh, and S. A. Mauger, *Langmuir* **36** (2020) 12247.
31. "P-block single-metal-site tin/nitrogen-doped carbon fuel cell cathode catalyst for oxygen reduction reaction", F. Luo, A. Roy, L. Silvioli, D. A. Cullen, A. Zitolo, M. T. Sougrati, I. C. Oguz, T.

- Mineva, D. Teschner, S. Wagner, J. Wen, F. Dionigi, U. I. Kramm, J. Rossmeisl, F. Jaouen, and P. Strasser, *Nature Materials* **19** (2020) 1215.
32. "Utilizing ink composition to tune bulk-electrode gas transport, performance, and operational robustness for a Fe–N–C catalyst in polymer electrolyte fuel cell", L. Osmieri, G. Wang, F. C. Cetinbas, S. Khandavalli, J. Park, S. Medina, S. A. Mauger, M. Ulsh, S. Pylypenko, D. J. Myers, K.C. Neyerlin, *Nano Energy* **75** (2020) 104943.
  33. "Improving the bulk gas transport of Fe-N-C platinum group metal-free nanofiber electrodes via electrospinning for fuel cell applications", S. Kabir, S. Medina, G. Wang, G. Bender, S. Pylypenko, K. C. Neyerlin, *Nano Energy* **73** (2020) 104791.
  34. "X-ray photoelectron spectroscopy and rotating disk electrode measurements of smooth sputtered Fe-N-C films", Y. Xu, M.J. Dzara, S. Kabir, S. Pylypenko, K. Neyerlin, A. Zakutayev, *Appl. Surf. Sci.* **515** (2020) 146012.
  35. "Novel platinum group metal-free catalyst ink deposition system for combinatorial polymer electrolyte fuel cell performance evaluation", J. Park and D. Myers, *J. Power Sources* **480** (2020) 228801.
  36. "Coupling High-Throughput Experiments and Regression Algorithms to Optimize PGM-Free ORR Electrocatalyst Synthesis", M. Karim, M. Ferrandon, S. Medina, E. Sture, N. Kariuki, D.J. Myers, E.F. Holby, P. Zelenay, and T. Ahmed, *ACS Appl. Energy Mater.* **3**(9) (2020) 9083.
  37. "Status and Challenges for the Application of Platinum Group Metal-Free Catalysts in Proton Exchange Membrane Fuel Cells", L. Osmieri, J. Park, D.A. Cullen, P. Zelenay, D.J. Myers, K. C. Neyerlin, *Curr. Opin. Electrochem.* **25** (2021) 100627.
  38. "Single-Iron Site Catalysts with Self-Assembled Dual-size Architecture and Hierarchical Porosity for Proton-Exchange Membrane Fuel Cells", X. Zhao, X. Yang, M. Wang, S. Hwang, S. Karakalos, M. Chen, Z. Qiao, L. Wang, B. Liu, Q. Ma, D.A. Cullen, D. Su, H. Yang, H.Y. Zang, Z. Feng, G. Wu, *Appl. Catal. B: Environ.* **279** (2020) 119400.
  39. "Durability evaluation of a Fe-N-C catalyst in polymer electrolyte fuel cell environment via accelerated stress tests", L. Osmieri, D.A. Cullen, H.T. Chung, R.K. Ahluwalia, K.C. Neyerlin, *Nano Energy* **78** (2020) 105209.
  40. "Understanding water management in platinum group metal-free electrodes using neutron imaging", S. Komini Babu, D. Spornjak, R. Mukundan, D.S. Hussey, D. L. Jacobson, H. T. Chung, G. Wu, A. J. Steinbach, S. Litster, R. L. Borup, and P. Zelenay, *J. Power Sources* **472** (2020) 228442.
  41. "Preparation of Non-precious Metal Electrocatalysts for the Reduction of Oxygen Using a Low-Temperature Sacrificial Metal;" T. Al-Zoubi, Y. Zhou, X. Yin, B. Janicek, C.-J. Sun, C. Schulz, X. Zhang, A. Gewirth, P. Huang, P. Zelenay, H. Yang, *J. Am. Chem. Soc.* **142** (12) (2020) 5477.
  42. "Evolution Pathway from Iron Compounds to Fe<sub>2</sub>(II)-N<sub>x</sub> Sites through Gas-Phase Iron during Pyrolysis", J. Li, L. Jiao, E. Wegener, L. L. Richard, El Liu, A. Zitolo, M. T. Sougrati, S. Mukerjee, Z. Zhao, Y. Huang, F. Yang, S. Zhong, H. Xu. A. J. Kropf, F. Jaouen, D. J. Myers, Q. Jia, *J. Am. Chem. Soc.* **142** (2020) 1417.

43. "Mass transport characterization of platinum group metal-free polymer electrolyte fuel cell electrodes using a differential cell with an integrated electrochemical sensor", A. G. Star, G. Wang, S. Medina, S. Pylypenko, K.C. Neyerlin, *J. Power Sources* **450**(29) (2020) (29) 227655.
44. "Improving the bulk gas transport of Fe-N-C platinum group metal-free nanofiber electrodes via electrospinning for fuel cell applications", S. Kabir, S. Medina, G. Wang, G. Bender, S. Pylypenko, K.C. Neyerlin, *Nano Energy* **73** (2020) 104791.
45. "Elucidating the role of ionomer in the performance of platinum group metal-free catalyst layer via in situ electrochemical diagnostics", G. Wang, L. Osmieri, A. G. Star, J. Pfeilsticker, K.C. Neyerlin, *J. Electrochem. Soc.* **167** (2020) 044519.
46. "Use of a segmented cell for the combinatorial development of platinum group metal-free electrodes for polymer electrolyte fuel cells", L. Osmieri, S. Mauger, M. Ulsh, K.C. Neyerlin, G. Bender, *J. Power Sources* **452** (2020) 227829.
47. "X-ray photoelectron spectroscopy and rotating disk electrode measurements of smooth sputtered Fe-N-C films", Y. Xu, M.J. Dzara, S. Kabir, S. Pylypenko, K. Neyerlin, A. Zakutayev, *Appl. Surf. Sci.*, **515** (2020) 146012.
48. "Thermally Driven Structure and Performance Evolution of Atomically Dispersed FeN<sub>4</sub> Sites for Oxygen Reduction", J. Li, H. Zhang, W. Samarakoon, W. Shan, D. A. Cullen, S. Karakalos, M. Chen, D. Gu, K. L. More, G. Wang, Z. Feng, Z. Wang, G. Wu, *Angew. Chem. Int. Ed.* **59** (2019) 18971.
49. "Heat-Treated Iron Porphyrin Aerogels for Oxygen Reduction Reaction", N. Zion, D. A. Cullen, P. Zelenay, L. Elbaz, *Angew. Chem. Int. Ed.* **58** (2019) 2.
50. "2,2'-Dipyridylamine as Heterogeneous Organic Molecular Electrocatalyst for Two-Electron Oxygen Reduction Reaction in Acid Media", X. Yin, L. Lin, U. Martinez, P. Zelenay, *ACS Appl. Energy Mater.* **2** (2019) 7272.
51. "Resolving Active Sites in Atomically Dispersed Electrocatalysts for Energy Conversion Applications", D. A. Cullen, K. L. More, K. C. Neyerlin, H. T. Chung, P. Zelenay, D. Myers, *Microscopy and Microanalysis*, **25** S2 (2019) 2066.
52. "Elucidation of Fe-N-C electrocatalyst active site functionality via in-situ X-ray absorption and operando determination of oxygen reduction reaction kinetics in a PEFC", L. Osmieri, R. K. Ahluwalia, X. Wang, H. T. Chung, X. Yin, A. J. Kropf, J. Park, D. A. Cullen, K. L. More, P. Zelenay, D. J. Myers, K. C. Neyerlin, *Appl. Catal. B: Environ.* **257** (2019) 117929.
53. "High-performance fuel cell cathodes exclusively containing atomically dispersed iron active sites", H. Zhang, H. T. Chung, D. A. Cullen, S. Wagner, U. I. Kramm, K. L. More, P. Zelenay, G. Wu, *Energy Environ. Sci.* **12** (2019) 2548.
54. "Highly active atomically dispersed CoN<sub>4</sub> fuel cell cathode catalysts derived from surfactant-assisted MOFs: carbon-shell confinement strategy", Y. He, S. Hwang, D. A. Cullen, M. A. Uddin, L. Langhorst, B. Li, S. Karakalos, A. J. Kropf, E. C. Wegener, J. Sokolowski, M. Chen, D. Myers, D. Su, K. L. More, G. Wang, S. Litster, G. Wu, *Energy Environ. Sci.* **12** (2019) 250.
55. "PGM-free ORR catalysts designed by templating PANI-type polymers containing functional groups with high affinity to iron", X. Yin, H. T. Chung, U. Martinez, L. Lin, K. Artyushkova, P. Zelenay, *J. Electrochem. Soc.* **166** (7) (2019), F3240.

56. "Experimental and Theoretical Trends of PGM-free Electrocatalysts for the Oxygen Reduction Reaction with Different Transition Metals", U. Martinez, E. F. Holby, S. Komini Babu, K. Artyushkova, L. Lin, S. Choudhury, P. Zelenay, *J. Electrochem. Soc.*, **166** (7) (2019) F3136.
57. "Performance of Polymer Electrolyte Fuel Cell Electrodes with Atomically Dispersed (AD) Fe-C-N ORR Catalyst", R. K. Ahluwalia, X. Wang, L. Osmieri, J-K Peng, H. T. Chung, and K. C. Neyerlin, *J. Electrochem. Soc.* **166** (2019) F1096.
58. "Nitrogen-Doped Graphene Oxide Electrocatalysts for the Oxygen Reduction Reaction;" J. H. Dumont, U. Martinez, K. Artyushkova, G. M. Purdy, A. M. Dattelbaum, P. Zelenay, A. Mohite, P. Atanassov, G. Gupta, *ACS Appl. Nano Mater.* **2** (2019) 1675.
59. "PGM-free Cathode Catalysts for PEM Fuel Cells: a Mini-Review on Stability Challenges", Y. Shao, J.-P. Dodelet, G. Wu, P. Zelenay, *Adv. Mater.* **31** (2019) 1807615.
60. "Progress in the Development of Fe-based PGM-free Electrocatalysts for Oxygen Reduction Reaction", U. Martinez, S. Komini Babu, E. F. Holby, H. T. Chung, X. Yin, P. Zelenay, *Adv. Mater.*, **31** (2019) 1806545.
61. "Atomically Dispersed Manganese Catalysts for Oxygen Reduction in Proton-exchange Membrane Fuel Cells", J. Li, M. Chen, D.A. Cullen, S. Hwang, M. Wang, B. Li, K. Liu, S. Karakalos, M. Lucero, H. Zhang, C. Lei, H. Xu, G.E. Sterbinsky, Z. Feng, D. Su, K. L. More, G. Wang, Z. Wang, G. Wu, *Nat. Catal.* **1** (12) (2019) 935.
62. "Highly Graphitic Mesoporous Fe,N-doped Carbon Materials for Oxygen Reduction Electrochemical Catalysts", D. Kim, N.P. Zussblatt, H.T. Chung, S.M. Becwar, P. Zelenay, B.F. Chmelka, *ACS Appl. Mater. Interfaces* **10** (2018) 25337.
63. "Kinetic Models for the Degradation Mechanism of the PGM-free ORR Catalysts", X. Yin, P. Zelenay, *ECS Trans.* **85** (13) (2018) 1239.
64. "Metal-organic Framework-derived Nitrogen-doped Highly Disordered Carbon for Electrochemical Ammonia Synthesis using N<sub>2</sub> and H<sub>2</sub>O in Alkaline Electrolytes", S. Mukherjee, D.A. Cullen, S. Karakalos, K. Liu, H. Zhang, S. Zhao, H. Xu, K.L. More, G. Wang, G. Wu, *Nano Energy* **48** (2018) 217.
65. "ElectroCat: DOE's Approach to PGM-free Catalyst and Electrode R&D", S.T. Thompson, A.R. Wilson, P. Zelenay, D.J. Myers, K.L. More, K.C. Neyerlin, D. Papageorgopoulos, *Solid State Ionics* **319** (2018) 68.
66. "Elucidation of role of graphene in catalytic designs for electroreduction of oxygen", P. J. Kulesza, J. K. Zak, I. A. Rutkowska, B. Dembinska, S. Zoladek, K. Miecznikowski, E. Negro, V. Di Noto, and P. Zelenay, *Curr. Opin. Electrochem.* **9** (2018) 257.
67. "Durability Challenges and Perspective in the Development of PGM-free Electrocatalysts", U. Martinez, S. Komini Babu, E. F. Holby, and P. Zelenay, *Curr. Opin. Electrochem.* **9** (2018) 224.
68. "Nitrogen-coordinated Single Atom Cobalt Sites Derived from Metal Organic Frameworks for High Performance Oxygen Reduction in Acidic Media", X.X. Wang, D.A Cullen, Y.-T. Pan, S. Hwang, M. Wang, Z. Feng, J. Wang, M.H. Engelhard, H. Zhang, Y. He, Y. Shao, D. Su, K.L More, J.S Spendelow, G. Wu, *Adv. Mater.* **30** (2018) 217.

69. "Effects of MEA Fabrication and Ionomer Composition on Fuel Cell Performance of PGM-free ORR Catalyst", X. Yin, L. Lin, H. T. Chung, S. Komini Babu, U. Martinez, G. M. Purdy, and P. Zelenay, *ECS Trans.* **77** (11) (2017) 1273.
70. "Direct Atomic-Level Insight into the Active Sites of a High-Performance PGM free ORR Catalyst", H. T. Chung, D. A. Cullen, D. Higgins, B. T. Sneed, E. F. Holby, K. L. More, and P. Zelenay, *Science* **357** (6350) (2017) 479.
71. "Modeling Electrochemical Performance of the Hierarchical Morphology of Precious Group Metal-free Cathode for Polymer Electrolyte Fuel Cell", S. Komini Babu, H. T. Chung, P. Zelenay, and S. Litster, *J. Electrochem. Soc.* **164** (9) (2017) F1037.