Di Chen, Ph.D

EDUCATION

Massachusetts Institute of Technology — **Cambridge, USA**
Ph.D, Materials Science and Engineering — **June 2014**
Advisor: Prof. Harry L. Tuller

Tsinghua University — **Beijing, China**
B.S., Materials Science and Engineering — **July 2008**

RESEARCH EXPERIENCE

Future Lab, Tsinghua University — **Beijing, China**
Associate Professor (副研究员) — **Oct. 2019- present**

Department of Materials Science and Engineering, Stanford University — **Palo Alto, CA, USA**
Postdoc (Advisor: Prof. William C. Chueh) — **Oct. 2016- Sept.2019**

Banzan International Group Corporation — **Cambridge, MA, USA**
Chief Science Officer — **June 2015- Oct. 2016**

Crystal Physics and Electroceramics Laboratory, MIT — **Cambridge, MA, USA**
Postdoc (Advisor: Prof. Harry L. Tuller) — **June 2014- May 2015**

Department of Materials Science and Engineering, MIT — **Cambridge, MA, USA**
Research Assistant (Advisor: Prof. Harry L. Tuller) — **Sept. 2008- June 2014**

JOURNAL PUBLICATIONS (†equal contribution, *corresponding author)

25. A. Yang†, G. Zhou†, X. Kong, R. A. Vila, A. Pei, Y. Wu, X. Yu, X. Zheng, C. Wu , B. Liu, H. Chen, Y Xu, **D. Chen**, Y. Li, S. Fakra, H. Y. Hwang, J. Qin, S. Chu, Y. Cui*, Electrochemical generation of liquid and solid sulfur on two-dimensional layered materials with distinct areal capacity, *accepted by Nature Nanotechnology* (2020).

24. **D. Chen**, Z. Guan, D. Zhang, S. Nemsak, L. Trotochaud, H. Bluhm, E. Crumlin, H. L. Tuller, and W. C. Chueh*, Constructing pathway of mixed ion & electron transfer reactions: O_2 incorporation in $Pr_{0.1}Ce_{0.9}O_{2-x}$, *Nature Catalysis* (2020).

23. X. Mao, P. Brown, C. Červinka, G. Hazell, H. Li, Y. Ren, D. Chen, R. Atkin, J. Eastoe, I. Grillo, A. A. H. Padua, M. F. C. Gomes, T. A. Hatton*, *Nature Materials*,18, 1-8 (2019)

22. S. Schmidtchen, H. Fritze*, S. Bishop, **D. Chen**, H. L. Tuller, Thin-Film Thermogravimetry Applied to Praseodymium-Cerium Oxide Films at High Temperatures, *Appl. Phys. Lett.*, 112, 213502 (2018).

21. S. Schmidtchen, H. Fritze*, S. Bishop, **D. Chen**, H. L. Tuller, Chemical Expansion of Praseodymium-Cerium Oxide Films at High Temperatures, *Solid State Ionics*, 319, 61 (2018).

20. J.G. Swallow, J.J. Kim, J.M. Maloney, **D. Chen**, J.F. Smith, S.R. Bishop, H.L. Tuller, K.J. Van Vliet*, Dynamic chemical expansion of thin film non-stoichiometric oxides at extreme temperatures, *Nature Mateirals*, 16, 749 (2017*)*.

19. Z. Guan, **D. Chen**, W. Chueh*, Analyzing the dependence of oxygen incorporation current density on overpotential and oxygen partial pressure in mixed conducting oxide electrodes, *Phys. Chem. Chem. Phys*, 19, 23414, (2017).

18. J. Sheth, **D. Chen**, J.J. Kim, W. Bowman, P. Crozier, H.L. Tuller, S. Misture, S. R. Bishop, B. Sheldon*, Role of grain size in redox induced compositional stress in Pr doped ceria thin films, *Phys. Chem. Chem. Phys.*,19, 12206, (2017).

17. J. J. Kim, S. R. Bishop, **D. Chen**, H. L. Tuller*, Defect Chemistry of Pr Doped Ceria Thin Films Investigated by in Situ Optical and Impedance Measurements, *Chemistry of Materials*, 29, 1999, (2017).

16. J. Sheth*, **D. Chen**, J.J. Kim, W. Bowman, P. Crozier, H.L. Tuller, S. Misture, S. Zdzieszynski, B. Sheldon, S. R. Bishop*, Coupling of strain, stress, and oxygen non-stoichiometry in thin film $Pr_{0.1}Ce_{0.9}O_{2-\delta}$, *Nanoscale*, 8, 16499, (2016).

15. **D. Chen***, S. R. Bishop, H. L. Tuller*, Non-stoichiometry in oxide thin films operating under anodic conditions: A chemical capacitance study of the praseodymium-cerium oxide system. *Chemistry of Materials*, 26, 6622 (2014).

14. **D. Chen**, H. L. Tuller*, Voltage controlled nonstoichiometry in oxide thin films: $Pr_{0.1}Ce_{0.9}O_{2-\delta}$ case study. *Advanced Functional Materials*, 24, 7638 (2014). Reported by *Materials Views*.

13. **D. Chen**[†], Y. Cao[†], D. Weng, H. L. Tuller*, Defect and transport model of ceria-zirconia solid solutions: $Ce_{0.8}Zr_{0.2}O_{2-\delta}$ - an electrical conductivity study. *Chemistry of Materials*, 26, 5143-5150 (2014).

12. **D. Chen***, A. Groß, D. C. Bono, J. Kita, R. Moos, H. L. Tuller, Electrical conductivity relaxation measurements: application of low thermal mass heater stick. *Solid State Ionics*, 262, 914 (2014).

11. Y. Zhang, J.J. Kim, **D. Chen**, H L. Tuller, G. Rutledge*, Electrospun polyaniline fibers as chemiresistive sensors for ammonia and nitrogen dioxide gases. *Advanced Functional Materials*, 24, 4005 (2014).

10. J.L.M. Rupp*, E. Fabbri, D. Marrocchelli, J.-W. Han, **D. Chen**, E. Traversa, H.L. Tuller, B. Yildiz, Scalable oxygen-ion transport kinetics in metal-oxide films: Impact of thermally induced lattice compaction in acceptor doped ceria films. *Advanced Functional Materials*, 24, 1562 (2014).

9. J.G. Swallow, W.H. Woodford, Y. Chen, Q. Lu, J.J. Kim, **D. Chen**, Y.-M. Chiang, W. C. Carter, B. Yildiz, H. L. Tuller, and K.J. Van Vliet*, Chemomechanics of ionically conductive ceramics for electrical energy conversion and Storage. *Journal of Electroceramics*, 32, 3 (2014).

8. F. Gao, **D. Chen**, H. L. Tuller, C. V. Thompson, T. Palacios*, On the redox origin of surface trapping in AlGaN/GaN high electron mobility transistors. *Journal of Applied Physics*, 115, 124506 (2014).

7. M. N. Luckyanova, **D. Chen**, W. Ma, H. L. Tuller, G. Chen*, B. Yildiz*, Control of thermal conductivity by annealing of reducible oxides – the case of $Pr_{0.1}Ce_{0.9}O_{2-\delta}$ thin films, *Applied Physics Letter* ,104, 061911 (2014).

6. J. J. Kim, S. R. Bishop, N. Thompson, **D. Chen**, H. L. Tuller*, Investigation of nonstoichiometry in oxide thin films by simultaneous in situ optical absorption and chemical capacitance measurement: Pr doped ceria – case study. *Chemistry of Materilas*, 26, 1374-1379 (2014).

5. **D. Chen**, S. R. Bishop, H. L. Tuller*, Non-stoichiometry in oxide thin films: a chemical capacitance study of the Praseodymium-Cerium oxide system. *Advanced Functional Materials*, 23, 2168 (2013).

4. **D. Chen***, S. Bishop, H. Tuller, Praseodymium-Cerium oxide thin film cathodes: study of oxygen reduction reaction kinetics. *Journal of Electroceramics*, 28, 62 (2012).

3. F. Gao, **D. Chen**, B. Lu, H. Tuller, C. V. Thompson, K. Stacia, U. K. Mishra, and T. Palacios*, Impact of moisture and fluorocarbon passivation on the current collapse of AlGaN/GaN HEMTs. *IEEE Electron Device Letters*, 33, 1378 (2012).

2. H. L. Tuller*, S. R. Bishop, **D. Chen**, Y. Kuru, J.-J. Kim, and T. S. Stefanik, Praseodymium doped ceria: Model mixed ionic electronic conductor with coupled electrical, optical, mechanical and chemical properties. *Solid State Ionics*, 225, 194 (2012).

1. Y. Kuru, D. Marrocchelli, S. Bishop*, **D. Chen**, B. Yildiz, and H. L. Tuller*, Anomalous chemical expansion behavior of $Pr_{0.2}Ce_{0.8}O_{2-\delta}$ thin films grown by pulsed laser deposition. *Journal of the Electrochemical Society*, 159, F799 (2012).

CONFERENCE PUBLICATIONS

6. J. G. Swallow, J. J. Kim, **D. Chen**, S. R. Bishop, J. F. Smith, H. L. Tuller and K. J. Van Vliet, Quantifying Chemical Expansion of Non-Stoichiometric Oxide Thin Films: Challenges and Opportunities, *ECS Transactions*, 68, 599-607 (2015).

5. J. J. Kim, **D. Chen**, S. R. Bishop, J. F. Smith, H. L. Tuller, Mass Transport in Oxide Thin Films - Visualization and Control, *ECS Transactions*, 69, 3-10 (2015).

4. S. R. Bishop, **D. Chen**, J. Sheth, S.T. Misture, B.W. Sheldon, J. J. Kim, and H. L.Tuller, Impact of size scale on electro-chemo-mechanical coupling properties in MIECs: Bulk and thin film $(Pr,Ce)O_{2-\delta}$. *ECS Transactions*, 61, 31 (2014).

3. **D. Chen**, S. R. Bishop, H. L. Tuller, Non-stoichiometry in oxide thin films operating under anodic conditions: a chemical capacitance study of the Praseodymium-Cerium oxide system. *ECS Transactions*, 57, 1387 (2013).

2. S. R. Bishop, **D. Chen**, Y. Kuru, J. J. Kim, T. S. Stefanik, H. L. Tuller, Measurement and modeling of electrical, mechanical, and chemical properties of a model mixed ionic electronic conductor: Pr doped Ceria. *ECS Transactions*, 33, 51 (2011).

1. S. R. Bishop, J. J. Kim, N. Thompson, **D. Chen**, Y. Kuru, T. S. Stefanik, and H. L. Tuller, Mechanical, electrical, and optical properties of (Pr,Ce)O2 solid solutions: kinetic studies. *ECS Transactions*, 35, 1137 (2011).

PATENTS

3. H.L. Tuller, SR. Bishop, **D. Chen**, W. Jung, Improved cathode for Solid Oxide Fuel Cells (SOFCs), *in processing*.

2. J. G. Swallow, K. J. Van Vliet, J.J. Kim, H. L. Tuller, **D. Chen**, J. M. Maloney, Dynamic Chemical Expansion of Thin Film Non-Stoichiometric Oxides at Extreme Temperatures, *in processing*.

1. F. Gao, **D. Chen**, B. Lu, T. Palacios, Passivation technique for wide bandgap semiconductor devices, International Patent No. WO: 2013/163137, (2012)

SELECTED PRESENTATIONS (4 Invited Talks, **4** Conference Presentations**)**

8. (Invited) "Understand the reaction mechanism of the oxygen incorporation reaction on MIEC surface", Asian SSI & Asian SOFC conference, Shanghai, China, 2018.

7. (Invited) "Use Synchrotron X ray to undertand the Energy Materials ", Stanford University-Zhejiang University Seminar, Zhejiang University, Hangzhou, China, 2017.

6. "The correlation between oxygen nonstoichiometry and oxygen exchange rate of praseodymium cerium oxide system", Materials Science & Technology Conference 2014, Pittsburgh, USA, Oct., 2014.

5. (Invited) "Measuring and controlling the non-stoichiometry of oxide thin films", University of Electronics Science and Technology of China, Chengdu, China, July, 2013.

4. (Invited) "Non-stoichiometry of oxide thin film: A case study on $Pr_{0.1}Ce_{0.9}O_{2-\delta}$", the 38th Institute Interest Seminar, Kyushu University, Fukuoka, Japan, June, 2013.

3. "Electrical conductivity relaxation measurements: Application of low thermal mass heater stick". The 19th International Conference on Solid State Ionics, Kyoto, Japan, June, 2013.

2. "The chemical capacitance of praseodymium doped cerium oxide thin films and relationship to nonstoichiometry", Electroceramics XIII Conference, University of Twente – Enschede, Netherlands, June, 2012.

1. "Electrical measurement of praseodymium-cerium oxide films", MRS Fall Meeting & Exhibition, Boston, USA, Nov., 2010.