

Curriculum Vitae

ZHE CHENG

Assistant Professor
Department of Mechanical and Materials Engineering,
Florida International University
EC 3400, 10555 W Flagler St, Miami, FL 33174
Tel: (Office) 305-348-1973
Email: zhcheng@fiu.com

RESEARCH INTERESTS

- Nanosized ceramic materials synthesis, processing, characterization, and mechanism study
- Functional ceramic and ceramic-metal hybrid materials for electrochemical energy conversion and storage
- Novel inorganic materials for solar cells
- Fundamental mechanism study of functional ceramic materials including their degradation under harsh environment through advanced *in-situ* characterization techniques

EDUCATION

Georgia Institute of Technology, Atlanta, Georgia, USA
Ph.D. in Materials Science and Engineering 2008
M.S. in Materials Science and Engineering 2004
Tsinghua University, Beijing, China
B.E. in Materials Science and Engineering, Minor in English 2001

EMPLOYMENT

- **Department of Mechanical & Materials Engineering, Florida International University, Miami, FL**
Assistant Professor 2013 -
- **Central Research & Development (CR&D), E. I. du Pont de Nemours and Company, Wilmington, Delaware, USA**
Senior research chemist & team leader 2011 - 2013
Research chemist 2008 - 2011

PROFESSIONAL MEMBERSHIPS & AFFILIATIONS

- Member of the Electrochemical Society (ECS)
- Member of the American Ceramic Society (ACerS)
- Reviewer for the *Journal of the American Ceramic Society*, *Journal of Power Sources*, *Journal of Electrochemical Society*, and *Electrochemical and Solid-State Letters*

AWARDS

- **Ross Coffin Purdy Award**, American Ceramic Society, 2010

- **Best Oral Presentation Award**, Georgia local section of the Electrochemical Society, 2005
- **Outstanding M.S. Thesis Award**, School of Materials Science & Engineering, Georgia Institute of Technology, 2005

PUBLICATIONS & PRESENTATIONS

Peer reviewed journal papers

1. **Cheng, Zhe**; Wang, Jeng-Han; Choi, Yong-Man; Lin, M. C.; Liu, Meilin. "From Ni-YSZ to sulfur-tolerant anode materials for SOFCs: electrochemical behavior, *in situ* characterization, modeling, and future perspectives," *Energy & Environmental Science* (2011), 4(11), 4380-4409. (*Invited perspectives*)
2. Yang, Lei; **Cheng, Zhe**; Liu, Meilin, and Wilson, Lane. "New insights into sulfur poisoning behavior of Ni-YSZ anode from long-term operation of anode-supported SOFCs," *Energy & Environmental Science*, (2010), 3, 1804-1809.
3. Yang, Lei; Wang, Shizhong; Blinn, Kevin; Liu, Mingfei; Liu, Ze; **Cheng, Zhe**; Liu, Meilin. "Enhanced sulfur and coking tolerance of a mixed ion conductor for SOFCs: BaZr_{0.1}Ce_{0.7}Y_{0.2-x}Yb_xO_{3-δ}," *Science* (2009), 326(5949), 126-129. (*American Ceramic Society Ross Coffin Purdy Award*)
4. Yang, Lei; Zuo, Chendong; Wang, Shizhong; **Cheng, Zhe**; Liu, Meilin. "A novel composite cathode for low-temperature SOFCs based on oxide proton conductors," *Advanced Materials* (2008), 20(17), 3280-3283.
5. Abernathy, Harry W; Koep, Eric; Compson, Charles; **Cheng, Zhe**; Liu, Meilin. "Monitoring Ag-Cr interactions in SOFC cathodes using Raman spectroscopy," *Journal of Physical Chemistry C* (2008), 112(34), 13299-13303.
6. Choi, Songho; Wang, Jeng-Han; **Cheng, Zhe**; Liu, Meilin. "Surface modification of Ni-YSZ using niobium oxide for sulfur-tolerant anodes in solid oxide fuel cells," *Journal of the Electrochemical Society* (2008), 155(5), B449-B454.
7. **Cheng, Zhe**; Abernathy, Harry; Liu, Meilin. "Raman Spectroscopy of Nickel Sulfide Ni₃S₂," *Journal of Physical Chemistry C* (2007), 111(49), 17997-18000.
8. Wang, Jeng-Han; **Cheng, Zhe**; Bredas, Jean-Luc; Liu, Meilin. "Electronic and vibrational properties of nickel sulfides from first principles." *Journal of Chemical Physics* (2007), 127(21), 214705/1-214705/8.
9. **Cheng, Zhe**; Zha, Shaowu; Liu, Meilin. "Influence of Cell Voltage and Current on Sulfur Poisoning Behavior of Solid Oxide Fuel Cells," *Journal of Power Sources* (2007), 172, 688.
10. Zha, Shaowu; **Cheng, Zhe**; Liu, Meilin. "Sulfur poisoning and regeneration of Ni-based anodes in solid oxide fuel cells," *Journal of the Electrochemical Society* (2007), 154, B201.
11. **Cheng, Zhe**; Liu, Meilin. "Characterization of sulfur poisoning of Ni-YSZ anodes for solid oxide fuel cells using *in situ* Raman microspectroscopy," *Solid State Ionics* (2007), 178, 925.
12. Wu, Qi-Hui; Abernathy, Harry; **Cheng, Zhe**; Liu, Meilin. "FTIR study of the oxygen reduction reactions." *Surface Review and Letters* (2007), 14(4), 587-591.
13. **Cheng, Zhe**; Zha, Shaowu; Liu, Meilin. "Stability of materials as candidates for sulfur-resistant anodes of solid oxide fuel cells," *Journal of the Electrochemical Society* (2006), 153, A1302.

14. Dong, Jian; **Cheng, Zhe**; Zha, Shaowu; Liu, Meilin. "Identification of nickel sulfides on Ni-YSZ cermet exposed to H₂ fuel containing H₂S using Raman spectroscopy," *Journal of Power Sources* (2006), 156, 461.
15. **Cheng, Zhe**; Zha, Shaowu; Aguilar, Luis; Wang, Dean; Winnick, Jack; Liu, Meilin. "A Solid Oxide Fuel Cell Running on H₂S/CH₄ Fuel Mixtures," *Electrochemical and Solid-State Letters* (2006), 9, A31.
16. **Cheng, Zhe**; Zha, Shaowu; Aguilar, Luis; Liu, Meilin. "Chemical, electrical, and thermal properties of strontium doped lanthanum vanadate," *Solid State Ionics* (2005), 176, 1921.
17. Zha, Shaowu; **Cheng, Zhe**; Liu, Meilin. "A sulfur-tolerant anode material for SOFCs - Gd₂Ti_{1.4}Mo_{0.6}O₇," *Electrochemical and Solid-State Letters* (2005), 8, A406.
18. Zha, Shaowu; Tsang, Philip; **Cheng, Zhe**; Liu, Meilin. "Electrical properties and sulfur tolerance of La_{0.75}Sr_{0.25}Cr_{1-x}Mn_xO₃ under anodic conditions." *Journal of Solid State Chemistry* (2005), 178(6), 1844-1850.
19. Aguilar, Luis; Zha, Shaowu; **Cheng, Zhe**; Winnick, Jack; Liu, Meilin. "A solid oxide fuel cell operating on hydrogen sulfide (H₂S) and sulfur-containing fuels." *Journal of Power Sources* (2004), 135(1-2), 17-24.
20. Tang, Zilong; Zhang, Junying; **Cheng, Zhe**; Zhang, Zhongtai. "Synthesis of nanosized rutile TiO₂ powder at low temperature," *Materials Chemistry and Physics* (2002), 77, 314.

Conference papers

1. **Cheng, Zhe**; Liu, Meilin, "Rational Design of Sulfur-Tolerant Anode Materials for Solid Oxide Fuel Cells," *ECS Transactions* (2013), 58(2), Electrochemical Synthesis of Fuels 2, 217-230.
2. Zha, Shaowu; **Cheng, Zhe**; Liu, Meilin. "Gd₂Ti_{2-x}Mo_xO₇-based anode materials for H₂S-air solid oxide fuel cells," *ECS Transactions* (2006), 1(7), Solid State Ionic Devices IV, 293-302.
3. **Cheng, Zhe**; Sacks, Michael D.; Wang, Chang-An.; Yang, Zhaohui. "Preparation of nanocrystalline silicon carbide powders by carbothermal reduction," *Ceramic Transactions* (2003), 154, 15.
4. **Cheng, Zhe**; Sacks, Michael D.; Wang, Chang-An. "Synthesis of nanocrystalline silicon carbide powders," *Ceramic Engineering and Science Proceedings* (2003), 24, 23-32.
5. Jain, Anubhav; Sacks, Michael D.; Wang, Chang-An; Middlemans, Michael; **Cheng, Zhe**. "Processing of nanocrystalline zirconium carbide powders." *Ceramic Engineering and Science Proceedings* (2003), 24, 41-49.
6. Wang, Chang-An; Sacks, Michael D.; Staab, Greg A.; **Cheng, Zhe**. "Solution-based processing of nanocrystalline SiC." *Ceramic Engineering and Science Proceedings* (2002), 23(4), 701-709.

Invited book chapter

- **Cheng, Zhe**; Wang, Jeng-Han; Liu, Meilin. "Chapter 2 - Anodes," in *Solid Oxide Fuel Cells: Materials Properties and Performance*, edited by Fergus, Jeffrey W.; Hui, Rob; Li, Xianguo; Wilkinson, David P.; Zhang, Jiujun. CRC Press, Taylor & Francis Group, Boca Raton, FL (2009), 73-129.

Patents

1. Cheng, Lap-tak; **Cheng, Zhe**; Lai, Cheng-yu; Lu, Meijun. "Etching composition," US Pat. Appl. (2012), US20120180852.

2. Yang, Lei; **Cheng, Zhe**; Liu, Ze; Liu, Meilin. “Chemical compositions, methods of making the chemical compositions, and structures made from the chemical compositions,” PCT Int. Appl. (2010), WO2010051441A1.
3. Tang, Zilong; Zhang, Junying; Zhang, Zhongtai; **Cheng, Zhe**; Luo, Shaohua. “Manufacture of nanometered rutile titania at low temperatures,” CN Pat. Appl. (2002), CN1351962.

Presentations

1. **Cheng, Zhe**; Zha, Shaowu; Abernathy, Harry; Liu, Meilin. “Experimental investigation of the sulfur poisoning process for solid oxide fuel cell anodes,” presented at the *31st International Conference & Exposition on Advanced Ceramics & Composites*, Daytona Beach, Florida, 01/2007. (Oral)
2. **Cheng, Zhe**; Zha, Shaowu; Liu, Meilin. “Sulfur-anode interaction for solid oxide fuel cells,” presented at the *Workshop on Industry & University Cooperative Research Centers (I/UCRC) for Fuel Cells at University of South Carolina – Georgia Tech*, Atlanta, Georgia, 02/2007. (Poster)
3. **Cheng, Zhe**; Zha, Shaowu; Choi, Yong Man; Choi, Songho; Liu, Meilin. “Sulfur-tolerant anodes for solid oxide fuel cells,” presented at the 1st meeting for the Strategic Energy Institute (SEI) at Georgia Institute of Technology, Atlanta, Georgia, 03/2006. (Poster)
4. **Cheng, Zhe**; Zha, Shaowu; Liu, Meilin. “Stability of materials as candidate for sulfur-resistant anode of solid oxide fuel cells,” presented at the *Workshop on Electrochemistry, MEMS and Nanotechnology of the Georgia local section of the Electrochemical Society*, Atlanta, Georgia, 09/2005. (Oral)
5. **Cheng, Zhe**; Sacks, Michael D.; Wang, Chang-An. “Processing of nanocrystalline SiC using solution-based precursors,” presented at the *27th International Conference & Exposition on Advanced Ceramics & Composites*, Cocoa Beach, Florida, 01/2003. (Oral)