

Biographical Sketch of Principal Investigator: Tongguang Zhai

a. Professional Preparation.

- 8/1/2000-8/14/2001 **University of Kentucky** **Postdoctoral Research Associate**
conducting research work on continuous cast Al
- 1/21/1995-4/30/2000 **University of Oxford, England** **Research Fellow**
studying short fatigue crack initiation & propagation
- 10/1/1994-12/31/1994 **Fraunhofer Institute for NDT, Germany** **Postdoctoral Assistant**
ultrasonic NDT and acoustic microscopy of materials
- 9/1991-9/1994 **Materials Science, University of Oxford, England** **Ph.D. student** D.Phil (Ph.D), 9/1996
- 9/1979-6/1983 **Materials Physics, University of Science & Technology Beijing, China** **Undergraduate** B.Sc., 6/1983

b. Appointments.

- 7/2007—present **Associate Professor**, Department of Chemical and Materials Engineering
University of Kentucky, Lexington, KY 40506-0046, USA
- 8/2001—6/2007 **Assistant Professor**, Department of Chemical and Materials Engineering
University of Kentucky, Lexington, KY 40506-0046, USA
- 9/1983—8/1986 **Research Engineer**, Welding Department
Institute of Building and Construction Research, Beijing, China

c. Publications (SCI indexed since 2017).

- 1) Pei Cai, Wei Wen, T. *Zhai (2018), A physics-based model validated experimentally for simulating short fatigue crack growth in 3-D in planar slip alloys, *Mater. Sci. Eng. A*, vol. 743, pp. 453-463.
- 2) R.J. Sun, L.H. Li, W. Guo, P. Peng, T. Zhai, Z.G. Che, B. Li, .C. Guo, Y. Zhu (2018), Laser shock peening induced fatigue crack retardation in Ti-17 titanium alloy, *Mater. Sci. Eng. A*, vol. 737, pp. 94-104.
- 3) S.X. Jin, Tungwai Ngai, G.W. Zhangb, T. Zhai, S. Jia, L.J. Li (2018), Precipitation strengthening mechanisms during natural ageing and subsequent artificial aging in an Al-Mt-Si alloy, *Mater. Sci. Eng. A*, vol. 724, pp. 53-59.
- 4) S.X. Jin, T.W. Ngai, L.J. Li, S.J. Jia, T. Zhai, D.J. Ke (2018), Aging Response and Precipitation Behavior after 5% Pre-Deformation of an Al-Mg-Si-Cu Alloy (2018), *Materials*, vol. 11, 1-11.
- 8) C. Yang, B Zhang, D Zhao, X Li, T. Zhai, Q Han, F Liu (2017), In-situ synthesis of AlN/Mg-Al composites with high strength and high plasticity, *Journal of Alloys and Compounds*, vol.699, pp. 627-632.
- 9) L. Yang, P. Cai, Z.Q. Xu, Y. Jin, C.Y. Liang, F.X. Yin, T. *Zhai (2017), A 3-D model for quantification of fatigue weak-link density and strength distribution in an A713 cast aluminum alloy, *Int. J. Fatigue*, vol. 96
- 10) Yi Xu, *Hiromi Nagaumi, Yi Han, Gongwang Zhang, T. *Zhai (2017), The Deformation Behavior and Microstructure Evolution of a Mn and Cr Containing Al-Mg-Si-Cu Alloy during hot Compression and Subsequent Heat Treatment, *Mater. Met. Trans. A*, vol. 48, pp. 1355-1365.
- 11) Z.Q. Lv, P. Cai, T. Yu, Y. Jin, H. F. Zhang, W.T. Fu, T. Zhai (2017), Fatigue properties and damage mechanism of a Cr-Mn austenitic steel, *Journal of Alloys and Compounds*, Vol. 691, pp. 103-109.

d. Synergistic Activities

- 1) **Successfully completed:** a NSF project to quantify short fatigue crack growth in 3D (9/2012-2/2017).
- 2) **Successfully completed:** a project sponsored by Alcoa Tech Center to quantify the deviation behaviours of fatigue crack growth in AA7050 Al alloys (6/2013-9/2014).

- 3) **Successfully completed:** NSF CAREER project to quantify the resistance of grain boundaries to short fatigue crack growth by both taking into account the twist and tilt angles of crack deflection at the grain boundaries, through experiments and theoretical modelling in high performance aluminium alloys (7/2007-6/2013).
- 4) **Organizer:** Symposia on Fatigue and Corrosion Mechanism at TMS Meetings 2017 and 2018.
- 5) **Key Reader:** Metallurgical and Materials Transactions A since 2011.
- 6) **Review Committee member:** ORNL CNMS user facilities.
- 7) **Papers Reviewed:** 6 papers from Materials Science and Engineering, etc. during 2017-2018.
- 8) **Proposals Reviewed:** 4 for ORNL CNMS program during 2017-2018.
- 9) **Seminars:** given at numerous universities and conferences during 2015-2018.
 - T. Zhai, Quantitative Relations between Microstructure and Fatigue Properties in Engineering Alloys, **Departmental Seminar**, Dept. of Materials Science and Engineering, University of Tennessee, Sept. 13, 2016.
- 10) **Graduate Student Awards (2014-2016)**
 - Wei Wen, Best Graduate Student Poster Award, Department of Chemical and Materials (2012).
 - Yan Jin, T. Zhai, et al., 3rd place Award in Graduate student poster competition at Center for Nanophase Materials Sciences meeting in Oak Ridge National Lab, 2014.
 - Gongwang Zhang, T. Zhai, et al, 3rd place Award in Graduate Student Poster competition at Center for Nanophase Materials Sciences meeting in Oak Ridge National Lab, 2015.
 - Pei Cai, T. Zhai, et al., 1st place Award in Graduate Student Poster Competition at Symposium on Materials Fatigue at TMS2016.
 - Pei Cai, T. Zhai, Best Graduate Student Poster at 2017 International symposium on multi-scale modeling and simulation of materials ISM3, July 3-7, 2017, Shenyang, China.

e. Collaborators & Other Affiliations

(i) Collaborators

X.Y. Wen	papers	Center for Aluminum Technology, UK
Y.C. Wu	papers	Department of Physics, Wuhan University, China

(ii) Graduate and Postdoctoral Advisors

G.A.D. Briggs	graduate & postdoctoral advisor	Department of Materials, University of Oxford
J.W. Martin	graduate & postdoctoral advisor	Department of Materials, University of Oxford
J. G. Morris	postdoctoral advisor	Department of Chemical & materials,
A.J. Wilkinson	postdoctoral advisor	Department of Materials, University of Oxford
W. Arnold	postdoctoral advisor	Fraunhofer Institute for NDT (IzFP), Germany

(iii) Thesis Advisor and Postgraduate-Scholar Sponsor

Former and Current Graduate Students

Wei Wen (PhD 2013),	Novelis Inc. as a Research Scientist
Qiang Zeng (PhD 2009),	Research Institute of Iron and Steels, China, as a Research Scientist
Jianhui Xu (PhD 2008),	with CNPC USA. as a Materials Engineer
Jinxia Li (PhD 2007),	with Airplane Engine company as a Materials Engineer
Xiuping Jiang (PhD 2007),	with Shaw Group as a Materials Engineer
Yan Jin (PhD May. 2016)	SECAT as Research Scientist
Lin Yang (PhD Dec. 2016)	
Pei Cai (PhD Aug. 2018)	
Gongwang Zhang (PhD Aug. 2018)	Institute of Metal Research, China, as a Research Scientist
Rami Almatani (MD April. 2017)	McMaster University PhD candidate
Randall Bowers (Master candidate, unfinished 2017)	

Visiting scholars: 20 (2002-2018)