

Qatar University
Materials Science & Technology
College of Arts & Science
Doha 2713, Qatar
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EDUCATION

Doctor of Philosophy in Materials Science and Engineering

North Carolina State University, Raleigh, NC, USA

May 2003

Title: Synthesis, Structure, and Properties of Nanocrystalline Zinc by Pulsed-Current Electrodeposition.

Master of Science in Metallurgical & Materials Science and Engineering

Suez Canal University, Suez - Egypt

June 1996

Title: Mechanical Alloying of Al-Ti Alloys.

Bachelor of Science in Metallurgical & Materials Science and Engineering

Suez Canal University, Suez - Egypt

July 1992

RESEARCH INTERESTS

Renewable Energy Materials

1. Photovoltaic (PV) Materials

- Achieve fundamental materials science and mechanics-based understanding on the influence of defects, residual stresses, and impurities on the electrical properties and fracture mechanics/strength of mono- and multi-crystalline PV silicon.

2. Thermoelectric Materials

- Processing and advanced characterizations of nanocrystalline Bismuth-based thermoelectric materials with high peak figure of merit ZT.

Nanocrystalline and Ultra-Fine Grained Materials

- The evolution of nanostructures in metals, alloys, and composites using non-equilibrium processing techniques including:
 - Mechanical milling/alloying "*in-situ* consolidation"
 - Pulse current electrodeposition
 - High pressure torsion (HPT)

- Equal channel angular pressing (ECAP).
- Advanced characterization of nanostructures and evaluation of their mechanical and corrosion properties.
- Thermodynamics and kinetics of grain growth in nanomaterials.
- Deformation mechanisms of ultra-fine grained and nanocrystalline materials.
- Processing and manufacturing of ultra-tough, light-weight nanomaterials.
- High entropy alloys (HEAs).

PROFESSIONAL EXPERIENCE

Qatar University

Materials Science and Technology Department

- Assistant Professor | August 2014 - Present

Suez University

Faculty of Petroleum and Mining Engineering

Materials and Metallurgical Engineering Department

- Assistant Professor | 2010 - Present

North Carolina State University

Materials Science and Engineering Department

- Post-Doctorate | 2004

Oak Ridge National Laboratory (ORNL) | July 2005

Collaboration with the Metals and Materials Division at ORNL

Advisor: Joseph Horton

- Investigation of the *in-situ* Transmission Electron Microscopy (TEM) during straining of nanocrystalline materials.

PUBLICATIONS

- Total citation # **2139**.
- H-Index **17**,
- i10-Index **20**.

- Publication # 20 is listed the second best among the "Top 25 Hottest Articles" in *Scripta Materialia* by SciVerse/ScienceDirect: (<http://top25.sciencedirect.com/subject/materials-science/15/journal/scripta-materialia/13596462/archive/30/>). A certificate is attached.
- Publication # 31 is listed the 9th best among the "Top 25 Hottest Articles" in *Acta Materialia* by SciVerse/ScienceDirect:(<http://top25.sciencedirect.com/subject/materials-science/15/journal/acta-materialia/13596454/archive/6/>). A certificate is attached.
- Publication # 14 is listed the 14th best among the "Top 25 Hottest Articles" in *Acta Materialia* by SciVerse/ScienceDirect:(<http://top25.sciencedirect.com/subject/materials-science/15/journal/acta-materialia/13596454/archive/39/>). A certificate is attached.

Refereed Journal Articles:

- [1] Khaled Youssef, Alexander Zaddach, Changning Niu, Douglas Irving, Carl Koch "A Novel Low Density, High Hardness, High-Entropy Alloy with Close-packed Single-phase Nanocrystalline Structures", *Materials Research Letters*, Volume **2**, Issue 3, 95-99 (2015).
- [2] Suhrit Mula, Daria Setman, Khaled Youssef, R.O. Scattergood, Carl C Koch, "Structural evolution of Cu_{1-x}Y_x alloys prepared by mechanical alloying: their thermal stability and mechanical properties", *Journal of Alloys and Compounds*, **627**, 108-116 (2015).
- [3] Simon Leonard, Vladimir P. Markevich, Anthony R. Peaker, Bruce Hamilton, **Khaled Youssef**, and George Rozgonyi, "Molybdenum nano-precipitates in silicon: A TEM and DLTS study", *Physica Status Solidi B* 251, No. 11, 2201–2204 (2014).
- [4] H. Zheng, K. Jagannadham and **K. Youssef**, "Thermal Conductivity of Exfoliated p-type Bismuth Antimony Telluride", *Journal of Electronic Materials*, Volume 43, Issue 2, pp 320-328 (2014).
- [5] A. Peaker, B. Hamilton, S. Leonard, V. Markevich, **K. Youssef**, and G Rozgonyi "Recombination via nano-precipitates... a new mechanism for efficiency loss in solar silicon?", *Photovoltaic Specialist Conference (PVSC), 2014 IEEE 40th*, Issue Date: 8-13 June 2014.
- [6] Erik Zdanowicz, Thomas Dow, Ronald Scattergood, and **Khaled M. Youssef**, "Nanostructure Fabrication on Germanium and Silicon by Nanocoining Imprint Technique", *Precision Engineering*, **37**, 871-879 (2013).
- [7] Meirong Shi, **K. Youssef**, and G. Rozgonyi, "Fracture Strength of Photovoltaic Silicon Wafers Evaluated Using A Controlled Flaw Method ", *Advanced Engineering Materials*, **15**, 756-760 (2013).
- [8] **Khaled Youssef**, Meirong Shi, Chantelle Radue, Ethan Good, and George Rozgonyi, " Effect of Oxygen and Associated Residual Stresses on the Mechanical Properties of High Growth Rate Czochralski Silicon", *Journal of Applied Physics*, **113**, 133502 (2013).
- [9] Debidas Roy, Mark A. Atwater, **Khaled M. Youssef**, John Christopher Ledford, Ronald O. Scattergood, Carl C. Koch, " Studies on thermal stability, mechanical and electrical properties of nanocrystalline Cu_{99.5}Zr_{0.5} alloy", *Journal of Alloys and Compounds*, **558**, 44-49 (2013).

- [10] **Khaled Youssef**, Xuegong Yu, Mike Seacrist, and George Rozgonyi, "Understanding the Effect of Impurities and Grain Boundaries on Mechanical Behavior of Si via Nanoindentation of (110)/(100) Direct Si Bonded Wafers", *Journal of Materials Research*, **27**, 349-355 (2012).
- [11] P. Kulshreshtha, **K. Youssef**, and G. Rozgonyi, "Nano-indentation: A tool to investigate crack propagation related phase transitions in PV silicon", *Solar Energy Materials and Solar Cells*, **96**, 166-172 (2012).
- [12] H. Bahmanpour, A. Kajbafvala, M. Maneshian, H. Zargar, and K. Youssef, "Bulk Nanostructured Metals and Alloys: Processing, Structure, and Thermal Stability", *Journal of Nanomaterials*, Volume 2012, Article ID 193734, 1, (2012).
- [13] P. Kulshreshtha, Y. Yoon, E. Good, **K. Youssef**, and G. Rozgonyi, "Oxygen Precipitation Related Stress-Modified Crack Propagation in High Growth Rate Czochralski Silicon Wafers", *Journal of the Electrochemical Society*, **159**, H125-H129 (2012).
- [14] Hamed Bahmanpour, **Khaled M. Youssef**, Jelena Horky, Daria Setman, Mark A. Atwater, Michael J. Zehetbauer, Ronald O. Scattergood, and Carl C. Koch, "Deformation twins and related softening behavior in nanocrystalline Cu–30% Zn alloy", *Acta Materialia*, **60**, 3340-3349 (2012).
- [15] H. Bahmanpour, A. Kauffmann, M.S. Khoshkhoo, **K. Youssef**, S. Mula, J. Freudenberger, J. Eckert R. Scattergood, and C. Koch, "Effect of Stacking Fault Energy on Deformation Behavior of Cryo-Rolled Copper and Copper Alloys", *Materials Science and Engineering*, **A529**, 230-236 (2011).
- [16] **K. M. Youssef**, Y. B. Wang, X. Z. Liao, S. N. Mathaudhu, L. J. Kecskés, Y. T. Zhu, C. C. Koch, "High hardness in a nanocrystalline Mg₉₇Y₂Zn₁ alloy". *Materials Science and Engineering*, **A528**, 7494– 7499 (2011).
- [17] George Rozgonyi, **Khaled Youssef**, Prashant Kulshreshtha, Meirong Shi, and Ethan Good, " Silicon PV Wafers: Mechanical Strength and Correlations with Defects and Stress", *Solid State Phenomena*, **178-179**, 79-87 (2011).
- [18] **Khaled Youssef**, Miroslava Sakaliyska, Hamed Bahmanpour, Ronald Scattergood and Carl Koch, "Effect of stacking fault energy on mechanical behavior of bulk nanocrystalline Cu and Cu alloys", *Acta Materialia*, **59**, 5758-5764 (2011).
- [19] Hamed Bahmanpour, **Khaled Youssef**, Ronald Scattergood, and Carl Koch "Mechanical behavior of bulk nanocrystalline copper alloys produced by high energy ball milling", *Journal of Materials Science*, **46**, 6316-6322 (2011).
- [20] X.L. Wu, **K.M. Youssef**, C.C. Koch, S.N. Mathaudhu, L.J. Kecskés and Y.T. Zhu, "Deformation Twinning in A Nanocrystalline HCP Mg Alloy", *Scripta Materialia*, **64**, 213-216 (2011).
- [21] Carl Koch, Ronald Scattergood, **Khaled Youssef**, Ethan Chan, and Yuntian Zhu, "Nanostructured materials by mechanical alloying: new results on property enhancement", *Journal of Materials Science*, **45**, 4725–4732 (2010).

- [22] S. Gollapudi, K. V. Rajulapati, I. Charit, **K. M. Youssef**, C. C. Koch, R. O. Scattergood and K. L. Murty, "Understanding creep in nanocrystalline materials", *Transactions of the Indian Institute of Metals*, **63**, 373-378 (2010).
- [23] X. Yu, J. Lu, **K. Youssef**, and G. Rozgonyi, "Proximity gettering of Cu at a (110)/(001) grain boundary interface formed by direct silicon bonding", *Applied Physics Letters*, **94**, 221909 (2009).
- [24] **K. M. Youssef**, C. C. Koch, and P. S. Fedkiw, "Influence of Pulse Plating Parameters on the Synthesis and Preferred Orientation of Nanocrystalline Zinc from Zinc Sulfate Electrolyte", *Electrochimica Acta*, Vol. 54, 2, (2008), 677-683.
- [25] C. C. Koch, **K. M. Youssef**, R. O. Scattergood, "Mechanical Properties of Nanocrystalline Materials Produced by in situ Consolidation Ball Milling", *Materials Science Forum*, **579**, 15-28 (2008).
- [26] R. K. Gurdu, K. L. Murty, **K. M. Youssef**, R. O. Scattergood, and C. C. Koch, "Mechanical Behavior of Nanocrystalline Copper", *Materials Science and Engineering*, **A463**, 14-21 (2007).
- [27] **K. M. Youssef**, R. O. Scattergood, K. L. Murty, and C. C. Koch, "Nanocrystalline Al-Mg Alloy With Ultrahigh Strength and Good Ductility", *Scripta Materialia*, **54**, 251-256 (2006).
- [28] D. L. Zhang, S. Raynova, C.C. Koch, R.O. Scattergood, and **K. M. Youssef**, "Consolidation of a Cu–2.5 vol.% Al₂O₃ powder using high energy mechanical milling", *Materials Science and Engineering*, **A410-411**, 375 (2005).
- [29] Carl. C. Koch, **Khaled M. Youssef**, Ronald. O. Scattergood, and Korukonda L. Murty, "Breakthroughs in Optimization of Mechanical Properties Of Nanostructured Metals And Alloys", *Journal of Advanced Engineering Materials*, **7**, No. 9, 787 (2005).
- [30] **Khaled. M. Youssef**, Ronald. O. Scattergood, K. L. Murty, Joseph A. Horton, and Carl. C. Koch, "Ultrahigh Strength and High Ductility of Bulk Nanocrystalline Copper", *Applied Physics Letters*, **87**, 091904 (2005).
- [31] S. Cheng, E. Ma, Y. M. Wang, L. Kecskes, **K. M. Youssef**, C. C. Koch, U. P. Trociewitz and K. Han, "Tensile Properties of in-situ Consolidated Nanocrystalline Cu", *Acta Materialia*, **53**, 1521-1533 (2005).
- [32] D. L. Zhang, C. C. Koch, R. O. Scattergood and **K. M. Youssef**, "Bulk Nanostructured Cu-2.5vol.%Al₂O₃ Composite Synthesized Using High Energy Mechanical Milling", *Journal of Metastable and Nanocrystalline Materials*, **24-25**, 639-642 (2005).
- [33] **Khaled M. Youssef**, Ronald O. Scattergood, K. Linga Murty, and Carl. C. Koch, "Ultratough Nanocrystalline Copper With A Narrow Grain Size Distribution", *Applied Physics Letters*, **85**, 929-931 (2004).
- [34] **K. M. Youssef**, C. C. Koch, and P. S. Fedkiw, "Influence of Additives and Pulse Electrodeposition Parameters on Production of Nanocrystalline Zinc from Zinc Chloride Electrolytes", *Journal of the Electrochemical Society*, **151**, C103 (2004).

- [35] **K. M. Youssef**, C. C. Koch, and P. S. Fedkiw, "Improved Corrosion Behavior of Nanocrystalline Zinc Produced by Pulse-Current Electrodeposition", *Corrosion Science*, **46**, 51-64 (2004).
- [36] **K. M. Youssef**, P. S. Fedkiw, and C. C. Koch, "Pulse-Current Electrodeposition of Nanocrystalline Zinc", *Materials Science and Engineering*, **A341**, 174 (2003).

Conferences Articles:

- [1] Prashant Kulshreshtha, Ian Witting, **Khaled Youssef**, Ethan Good, and G. Rozgonyi "Crack Propagation in Large Diameter PV Silicon", *ECS Trans.*, **33**, Issue 17, 25-32 (2010).
- [2] **K. Youssef**, P. Kulshreshtha, and G. Rozgonyi, "Amorphization during Fracture of Thin Photovoltaic Silicon Wafers", *ECS Trans.*, **25**, 49-55 (2010).
- [3] P. Kulshreshtha, **K. Youssef**, and G. Rozgonyi, "Evaluating Amorphization around Micro-Cracks in PV Silicon", *Mater. Res. Soc. Symp. Proc.* V1210, Q05-08 (2010).
- [4] **K. Youssef**, P. Kulshreshtha, and G. Rozgonyi, "In-Situ Electrical Measurements of Thin Photovoltaic Silicon Wafers during Nanoindentation", *ECS Trans.*, **25**, (2009) 41-48.
- [5] P. Kulshreshtha, **K. Youssef**, and G. Rozgonyi, "Crack Propagation in PV Silicon", *ECS Trans.* 1067-1068 (2010).
- [6] G. Rozgonyi, J. Lu, M. Wagener, X. Yu, Y. Park, and **K. Youssef**, "Enhancing Silicon PV Materials Research via IC Wafer Engineering Defect Science Experiences and Industry/University Consortia: SiWEDS to SiSoC", the 5th International Symp. on Advanced Sci. and Tech. of Si Materials, JSPS Si, Nov. 10-14 (2008), Hawaii, USA.
- [7] G. Rozgonyi and K. Youssef, "Crystal Growth and Wafer Processing for High Yield and High Efficiency Solar Cells", *National Renewable Energy Lab*, NREL/SR-520-44375 (2008).
- [8] G. Srikant, K. V. Rajulapati, **K. M. Youssef**, I. Charit, C. C. Koch, R. Scattergood and K. L. Murty, "Do Nanocrystalline Materials Ever Attain a Steady State of Creep", *The 5th international conference on Creep, Fatigue and Creep-Fatigue Interaction-IGCAR, Kalpakkam India*, 306-312 (2008).
- [9] **Khaled M. Youssef** and George E. Rozgonyi, "Correlation of Polycrystalline Silicon Wafer Mechanical Properties with Minority-Carrier Lifetime", the 17th Workshop on Crystalline Silicon Solar Cells and Modules: Materials and Processing Proceeding, Vail – Colorado, August 5-8, 197 (2007).
- [10] Carl. C. Koch, **Khaled M. Youssef**, Ronald. O. Scattergood, and K. L. Murty, "Artifact-Free Bulk Nanocrystalline Grain Size (< 100 nm) Materials: The Processing Challenge", *Ultrafine Grained Materials IV*, Proceedings of a Symposium held during the TMS Annual Meeting, San Antonio, TX, United States, March 12-16, 3-10 (2006).

TEACHING EXPERIENCE

The following tables show the dates and the courses I taught as an instructor and a co-instructor

1. Instructor (Qatar Univ.)

	Class	Date
MATS590	Introduction to Photovoltaics	2014, 2015, 2016
MATS513	Functional Properties of Materials	2014
MATS511	Characterization and Properties of Materials	2014, 2015, 2016
MATS511-Lab	Characterization and Properties of Materials Lab	2014, 2015, 2016
MATS512	Thermodynamics, Phase Diagrams, and Kinetics of Materials	2015, 2016
MATS520	Mechanics of Materials	2016
MATS570	Introduction to Nanotechnology and Advanced Characterization Methods	2015
MATS580	Graduate Seminar	2015, 2016

2. Instructor (Suez University)

	Class	Date
	Physical Metallurgy	2011
	Mechanical Properties of Materials	2012

Teaching Workshops

- Intensive seven days Classroom Assessment Techniques “CATs” workshop that helped me to:
 - Know classroom assessment techniques
 - Discuss the benefits and challenges of using CATs
 - Explain and identify several CATs that can be applied in classrooms.
- Introduction to teaching.
- Active learning workshop (Introduction to the Teaching Portfolio).
- Managing disruptive classroom behaviors.
- Teaching in the lab.
- Introduction to Blackboard

GRANTS AND AWARDS

- Qatar National Research Fund (QNRF-NPRP) - NPRP9-180-2-094 (3 Years)
- Qatar University-Student grant QUST-CAS-SPR-14\15-6 | 2015 (1 Years)
- Hydro/Qatalum Industrial Grant | 2015 (1 Years)
- Qatar University Grant - QUUG-CAS-MST-14/15-9 | 2015 (2 Years)
- Qatar University-Student grant QUST-CAS-FALL-14\15-27 | 2014 (1 Years)
- National Science Foundation (NSF) – Award ID:IIP-1338820 | October 2013 (5 years).

PATENTS

- **Khaled M. Youssef**, C. C. Koch, P. S. Fedkiw, “Production of Nanocrystalline Zinc by Pulsed Electrodeposition”, Pending.
- **Khaled M. Youssef**, Ronald. O. Scattergood, K. L. Murty, and Carl. C. Koch," Production of Bulk Nanocrystalline Copper with Ultrahigh Strength and High Ductility by In-Situ Consolidation Ball Milling", File No. 09-004.
- **Khaled M. Youssef**, Ronald. O. Scattergood, K. L. Murty, and Carl. C. Koch," A Low Density, High Entropy metallic Alloy with Exceptional Strength to Weight Ratio, ", File No. 15-160.

INVITED TALKS

- [1] The Annual Aluminum Symposium, Doha, Qatar, December 14, 2015.
- [2] The Royal Society of Chemistry’s Second Gulf Symposium, The Design and Application of Advanced Materials, Qatar University, Qatar, December 10, 2014.
- [3] The 141st TMS Annual Meeting & Exhibition, Symposium: Solar Cell Silicon, Orlando, Florida, March 11-15, 2012.
- [4] Materials Today Webinar, “Nanomechanical Characterization in Materials for Energy” 2010, (<http://www.materialstoday.com/webinar/195>).
- [5] The 18th Workshop on Crystalline Silicon Solar Cells and Modules: Materials and Processes, National Renewable Energy Laboratory (NREL) Workshop, Vail, CO, August 2009.

PRESENTATIONS

- [1] **K. M. Youssef**, R. O. Scattergood, K. L. Murty, and C. C. Koch, “Effect of Processing Techniques on the Mechanical Properties of Nanocrystalline/Ultrafine Grained Metals”, The 133rd TMS Annual Meeting, Charlotte, NC, March 14, 2004.
- [2] **K. M. Youssef**, P. K. Kulshreshtha and G.A. Rozgonyi, “Amorphization during Fracture of Thin Photovoltaic Silicon Wafers”, Workshop on Probing the Limits of Strength, Lawrence Berkeley National Laboratory, CA, August 10-12, 2009.

- [3] **K. M. Youssef**, P. K. Kulshreshtha and G.A. Rozgonyi, "Mechanical Properties of Thin Mono- and Multi-Crystalline Photovoltaic Silicon Wafers", The 216th Electrochemical Society Meeting, Vienna, Austria, October 4-9, 2009.
- [4] **K. M. Youssef** and G.A. Rozgonyi, "Influence of Local Residual Stresses on Mechanical Properties and Crack Propagation of Silicon PV Wafers" The E-MRS Fall Meeting, Warsaw, Poland, September 13-17, 2010.
- [5] **K. M. Youssef**, P. K. Kulshreshtha and G.A. Rozgonyi, "Crack Propagation in PV Silicon", The 218th Electrochemical Society Meeting, Las Vegas, Nevada, October 10-15, 2010.
- [6] **K. Youssef**, H. Bahmanpour, C. Koch, and R. Scattergood "Mechanical Behavior of Bulk Nanocrystalline Copper Alloys Produced by High Energy Ball Milling", The Materials Science & Technology 2010 Conference and Exhibition, Houston, TX, October 17- 21, 2010.
- [7] Carl C. Koch, Ronald O. Scattergood, and **Khaled M. Youssef**, "Deformation Behavior of Nanostructured Copper Based Alloys As A Function of Stacking Fault Energy" *The Inter. Symp. on Plasticity*, San Juan, Puerto Rico, January 3-8, 2012.
- [8] Ronald O. Scattergood, Mostafa Saber, Carl C. Koch, and **Khaled M. Youssef**, " Thermal Stability of Nanoscale Grain Sizes" *MRS Fall Meeting*, Boston, MA, November 25-30, 2012.
- [9] Alexander Zaddach, Changning Niu, **Khaled Youssef**, Douglas Irving, Carl Koch, "Stacking Fault Energies and Mechanical Properties of FCC High Entropy Alloys", The 2014 TMS Annual Meeting, San Diego, CA, February 16-20, 2014.
- [10] A.R. Peaker, B. Hamilton, S. Leonard, V.P. Markevich, **K. Youssef** and G. Rozgonyi, "Recombination via nano-precipitates ... a new mechanism for efficiency loss in solar silicon", The 40th IEEE Photovoltaic Specialists Conference (PVSC), Denver, CO, June 8-13, 2014
- [11] Alexander Zaddach, **Khaled M Youssef**, Changning Niu, Douglas L Irving, Carl C Koch, "A Low-Density, Single-Phase High Entropy Alloy Produced by Mechanical Alloying", The 2015 TMS Annual Meeting, Nashville, TE, February 14-18, 2015.
- [12] Walid Mohamed, Marquis Kirk, Di Yun, Sumit Bhattacharya, Kun Mo, **Khaled Youssef**, K.L. Murty, A.M. Yacout, "Characterization of Developed Microstructure of Nanocrystalline Copper Post Neutron and Ion Irradiation", The 2015 TMS Annual Meeting, Nashville, TE, February 14-18, 2015.

PROFESSIONAL ASSOCIATIONS

- Editor - Journal of Nanomaterials, "<http://www.hindawi.com/journals/jnm>" | 2011-2015
- Referee for Materials Science and Engineering-A, Corrosion Science, Electrochimica Acta, Journal of materials science, Powder Diffraction, etc. | 2004-Present
- Member of TMS, | 2003-Present

PROFESSIONAL QUALIFICATIONS

- Proficient in utilizing the following:
 - TITAN 80-300 probe aberration corrected scanning transmission electron microscope (STEM).
 - Scanning and field emission scanning electron microscopes (JEOL JSM-6400F).
 - Transmission electron microscope (JEOL-2000FX) and high resolution transmission electron microscope (JEOL-2010FX).
 - Atomic force microscope.
 - Electron back scattered diffraction (EBSD).
 - X-ray diffraction.
 - Optical microscopes and metallography.
 - Diffraction scanning calorimetry (DSC).
 - Deep-level transient spectroscopy (DLTS).
 - Electron beam-induced current (EBIC).
- Extensive experience performing and analyzing results from mechanical tests such as:
 - Tensile and Compression testing.
 - Nanoindentation.
 - Shear Punch Testing.
 - Bending and Miniaturized Disc Bend Test (MDBT).
 - Microhardness.

COLLABORATORS

- | | |
|---|---|
| • Michael Zehetbauer University of Vienna | <i>HPT and powder consolidation</i> |
| • Xiaozhou Liao University of Sydney | <i>Twinning in nanomaterials</i> |
| • En Ma Johns Hopkins University | <i>Deformation mechanisms of nanomaterials</i> |
| • Shreyes Melkote Georgia Institute of Tech. | <i>Fracture mechanics of brittle materials</i> |
| • Ajeet Rohatgi Georgia Institute of Technology | <i>Electrically active defects in PV silicon</i> |
| • Xuegong Yu Zhejiang University | <i>Impurities and electrical properties in Si</i> |
| • Joseph Horton Oak Ridge National Laboratory | <i>In-situ TEM characterization</i> |
| • Suveen Mathaudhu US Army Laboratory | <i>Light alloys and composites</i> |
| • Tony Peaker University of Manchester | <i>Passivation and defects in semiconductors</i> |
| • Deliang Zhang University of Waikato | <i>Characterization of nano composites</i> |



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**TENSILE PROPERTIES OF IN SITU CONSOLIDATED NANOCRYSTALLINE CU
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