I-Wei Chen is Deputy Director of Penn’s Materials Research Center (LRSM) since 2009. He is best known for his work in ceramics with about 90 publications in the Journal of the American Ceramic Society. His thesis papers on stainless steel under Professor A.S. Argon are now textbook references for creep and fracture. In 1980’s he reported a series of in-situ HREM small particle experiments on zirconia, which established the mechanisms of nucleation and growth for martensitic transformations. He then introduced high pressure testing techniques to studies of zirconia ceramics; such work has constituted much of the basic understanding of transformation plasticity in ceramics. His research ranged from processing (powders, colloids, thin films, sintering, forming), structure (EXAFS, metal insulator transition), microstructure (grain growth, alloy design), properties (fracture, fatigue, plasticity, ferroelectrics, magnetoresistance, thermoelectrics) and new material design (superplastic ceramics, α-sialons, biomedical nanoparticles.) His current research in nanotechnology emphasizes thin film devices, magnetic resonance imaging and drug delivery. His 180 some journal papers have been cited over 7,000 times with an $h$-index of 50.
Patents


Books


**Book Chapters**


Journal Papers


**Other Papers (A Partial List)**


20. P.E. Reyes-Morel, X. Wu and I-W. Chen, "Deformation Characteristics of Textured Bi$_2$Sr$_1.5$Ca$_1.5$Cu$_2$O$_{8+x}$ and YBa$_2$Cu$_3$O$_{8+x}$ Polycrystals," in Ceramic Superconductors II, Research Update, Ed. M.F. Yan, American Ceramic Society, 43-50 (1988).


Invited Talks (A Partial List)


12. "Quasi-static Intergranular Fracture at 0.5 Tm—Mechanisms of Stress Relief Cracking in Low Alloy Steels," at Monash University, Australia, April 1985.


52. "X-ray Absorption Studies of ZrO\textsubscript{2} and CeO\textsubscript{2}," at the Atomic Structure, Bonding and Properties of Ceramics Meeting, Basic Science Division, The American Ceramic Society, Marco Island, FL, October 1991.
53. "Deformation Processing of Ceramics," at Purdue University, West Lafayette, IN, November 1991.


74. "Fracture Mechanics of Fatigue in Ceramics," at the 98th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1996.


77. "Perspectives on Relaxor Ferroelectrics," at the Korea Advanced Institute of Science and Technology, Seoul, Korea, October 1996.

78. “Phase Transformations of Silicon Nitride and Silicon Carbide,” at the Workshop on Grain Boundary Dynamics of Precursor-Derived Covalent Ceramics, Schloss Ringberg, Tegernsee, Germany, November 1996.


82. "Ceramic Superplasticity," Workshop on Atomistic Simulation of Crystal Plasticity and Fracture, Argonne, IL, August 1997


85. "Ferroelectric Thin Films," Department of Materials Science and Engineering, National Tsinghua University, Hsinchu, Taiwan, November 1997

86. "Ferroelectric Thin Films," Department of Materials Science and Engineering, National Chaotung University, Hsinchu, Taiwan, November 1997

87. "Local Disorder and Defects in Ferroelectric Perovskites," Department of Materials Science and Engineering, University of Illinois, Champaign-Urbana, IL, February 1998


89. "On Interface Related Phenomena in Ferroelectrics and Dielectrics," Annual Meeting of the American Ceramic Society, Cincinnati, OH, May 1998


118. "Multifunctional Nanoparticles and Their Hierarchies for Biomedical Applications," University of Tennessee, Knoxville, April 2004.


139. “A Perspective of Nanoceramics,” Shanghai Institute of Ceramics, Shanghai, China, December 2006.


“Residual Stress and Dead Layer Effects on Fine Grain and Nanograin Barium Titanate Ceramics,” Asian Meeting on Ferroelectrics (AMF6), Taipei, Taiwan, August 2008.


“Nonconventional Pressureless Sintering and Grain Growth,” Plenum lecture, Chinese International Conference on High-Performance Ceramics (CICC-6), Harbin, China, August 2009.

“Nanometallic Crystalline and Amorphous Thin Films with Switchable Resistance,” 11th International Conference on Ceramic Processing, Zurich, August 2010.

“New Electric Effects of 8-Y Zirconia,” Materials Science and Technology (MS&T10), Houston, October, 2010.

“A Size-dependent Nanoscale Metal-Insulator Transition in Random Materials.” Korea Advanced Institute of Science and Technology, Daejon, April, 2011.


Other Presentations (A partial list; * for the presenting author)


18. X. Wu,* P.E. Reyes-Morel and I-W. Chen, "Hot Extrusion of Bi$_2$(Sr,Ca)$_3$Cu$_2$O$_{8+x}$ and YBa$_2$Cu$_3$O$_{6+x}$ Wires," at the 1988 Fall Meeting of Materials Research Society, Boston, MA, November-December 1988.

19. X. Wu* and I-W. Chen, "Creep and Hot Extrusion of High Tc Superconductors," at the 91st Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1989.


29. K.J. Bowman* and I-W. Chen, "The Influence of Shear Coupling on Evaluating t to m Transformation in ZrO$_2$ Ceramics," at the 91st Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1989.


35. X. Wu* and I-W. Chen, "Superplastic Forming of Fine Grained Zirconia Ceramics and Composites," at the 92nd Annual Meeting of The American Ceramic Society, Dallas, TX, April 1990.


38. I-W. Chen* and S.L. Hwang, "Grain Growth Control in Nonstoichiometric Oxides - Space Charge and Boundary Mobility," at the 92nd Annual Meeting of The American Ceramic Society, Dallas, TX, April 1990.


43. S-Y. Liu* and I-W. Chen, "Fatigue Crack Growth and Life Time Prediction of Ceramics," at the 92nd Annual Meeting of The American Ceramic Society, Dallas, TX, April 1990.


51. X. Wu* and I-W. Chen, "Formability of Superplastic Si3N4 in Uniaxial and Biaxial Deformation," at the 93rd Annual Meeting of The American Ceramic Society, Cincinnati, OH, April 1991.


81. P. Li* and I-W. Chen, "X-ray Absorption Study of N-Stabilized ZrO$_2$," at the 96th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1994.


88. Z.K. Huang* and I-W. Chen, "Phase Relationships in Part of Sm, Si, Al/N, O System and Their Implications for Sm-SiAlON Fabrication," at the 96th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1994.


104. M. Engineer* and I-W. Chen, "Micromechanical Model of Fatigue Crack Growth in Ceramics," at the 98th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1996.

105. Z-K. Huang* and I-W. Chen, "Pressureless Sintering Si₃N₄ Ceramics by Using AlN and Rare-Earth Oxides," at the 98th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1996.

106. A. Rosenflanz* and I-W. Chen, "Transient Evolutions in SiAlON Ceramics Prepared from α and β-Si₃N₄ Powders," at the 98th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1996.

108. S. Gong* and I-W. Chen, "Processing and Properties of SiC-TiB₂ Composites," at the 98th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1996.


110. Y. Wang* and I-W. Chen, "Relaxation Spectra of Relaxor Ferroelectrics," at the 98th Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1996.


125. A. Rosenflanz* and I-W. Chen, "Microstructure Control and Mechanical Performance of In-Situ Toughened $\alpha'$-SiAlON Ceramics," at the 100th Annual Meeting of The American Ceramic Society, Cincinnati, OH, May 1998.


129. E.J. Winn* and I-W. Chen, “Laminar and Cellular Oxide Composites via a Rolling Technique,” at the 101st Annual Meeting of The American Ceramic Society, Indianapolis, IN, April 1999.


145. R.A. Shuba* and I-Wei Chen, “In-situ Toughened Ca α-SiAlON Ceramics: Mechanical Properties and Microstructure Observations,” at the 102nd Annual Meeting of The American Ceramic Society, St. Louis, MO, May 2000.


149. A. I. Mamchik* and I-Wei Chen, "Electrical and Magnetic Properties of BiMO₃ Perovskites," at the 103rd Annual Meeting of the American Ceramic Society, Indianapolis, IN, April 2001.

150. A.I. Mamchik* and I-Wei Chen, "Conductivity Measurements of Bi³⁺/La³⁺-Doped Barium Titanate," at the 103rd Annual Meeting of the American Ceramic Society, Indianapolis, IN, April 2001.

151. Y. Wang* and I-Wei Chen, "Study of Surface-Modified AlN Ceramics and PVDF Film," at the 103rd Annual Meeting of the American Ceramic Society, Indianapolis, IN, April 2001.

153. R. Shuba*, M. Zenotchkine and I-Wei Chen, "Structure-Property Relationships in In-Situ Toughened Alpha-SiAlONs," at the 103rd Annual Meeting of the American Ceramic Society, Indianapolis, IN, April 2001.


155. R. Shuba* and I-Wei Chen, "Tough $\alpha$-SiAlON with Low Liquid Content," at the 104th Annual Meeting of the American Ceramic Society, St. Louis, MO, April-May 2002.


