

Siu-Wai Chan Professor of Materials Science and Engineering
 Dept. of Applied Physics and Applied Mathematics
September 2022 Joint appointment with Dept. of Earth & Environmental Engr.
 School of Engineering and Applied Science,
 Columbia University, New York, NY 10027
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RESEARCH INTERESTS Crystal-size-dependent Properties of Nanocrystals, Grain Boundaries, Interfaces, and Defects in Films and Oxides for Devices, Energy and Environment.

EDUCATION Massachusetts Institute of Technology, Sc.D. in Materials Science and Engineering.
 Columbia University, B.S. in Metallurgy & Materials Sc. with honor. Francis B.F. Rhodes Prize

PROFESSIONAL EXPERIENCE Full Professor since 2002,
 Prof. of Henry Krumb School of Mines,
 Co-Chair of the Solid-State Program 2001-2010,
 Co-chair of Materials Science and Engineering Program and Committee 1997-1999.
 Executive Committee Member and Outreach Director of Materials Research Science & Engineering Center NSF-MRESC 1998-2009,
 Associate Professor Columbia University, till 2002,
 Metallurgy and Mining, Chemical Engineering and Materials, since 1998
 Applied Physics and Applied Mathematics.
 Visiting Professor, as the *Tan Fellow* at Nanyang Technological Univ., Materials Dept., Singapore 2004;
 Visiting Professor, as NSF 2004 *Advanced Fellow*, Univ. of Washington, Dept. of Materials Sc. and Engr., Seattle, WA.
 2004 Visiting Professor, as the *Guggenheim Fellow* Univ. of California San Diego, Physics Dept. of Physics, San Diego, California (host Prof. Robert Dynes, President of Univ. of California 2004-2008);
 Visiting Scientist, (full-salary support from IBM Microelectronics) IBM Watson Research Lab., 1999.
 Visiting Scientist, Bitter Magnet Lab, 1993-1995.
 Member of Technical Staff, Superconductors & Surface Treatments, Bell-Labs, Bellcore, NJ, 1985.

Prof. S.-W. Chan

*PROFESSIONAL
ACTIVITIES*

Member of the Minerals, Metals, Materials Society (TMS).
Committee editorial member of a special JOM issue on Computational Materials Science (2021).
Member of the American Ceramic Society (ACerS)
Strategic Planning Committee ACerS 2009-2010,
Chair of the Electronics Division of ACerS 2006-2007,
Chair Symposia at different MS&T Meetings,
Chair Symposia on High Temperature Superconductors at 1998 & 91 Materials Research Society (MRS) Fall Meetings.
Chair for various sessions at different MRS, TMS and ACerS Meetings,
President 1994 & Secretary 1993 of the Materials Science Club.
Panelist for National Science Foundation's program on Materials Research Science and Engineering Centers,
Reviewer on Materials Science Projects for NSF,
Reviewer on Materials Science Projects for Hong Kong University Research Council.
Reviewer for Philosophical Magazine, Applied Physics Letters, Journal of Applied Physics and Journal of Materials Research.
Faculty Advisor of Columbia Student Chapters of ACerS 1998-2007, TMS & ACerS 2007-2011, MRS since 1994, and Materials Advantage (for student members of ASM, AcerS, TMS, & AIST) since 2012.

ASSOCIATIONS

American Physical Society (APS);
Society of Women Engineers (SWE);
International Committee of Diffraction Data (ICDD);
Materials Research Society (MRS) Faculty Advisor of the CU Student Chapter over 25 years;
ASM International (ASM);
Association for Iron & Steel Technology (AIST);
The Minerals, Metals, Materials Society (TMS);
The American Ceramic Society (ACerS) Faculty Advisor of the CU-Student Chapter from 1999-2011.
Faculty Advisor of the CU-Student Chapter of Materials Advantage since 2012 (student-society for ASM, AIST, TMS, & ACerS).
American Chemical Society (ACS)

*HONORS &
AWARDS*

Presidential Faculty Fellow, from President William Jefferson Clinton and National Science Foundation. There are only 120 most promising professors in science and engineering were honored from 1992-1995.
https://www.nsf.gov/pubs/2001/nsf01118/nsf01118_5.htm
PFF had evolved into Presidential Early Career Award for Scientists and Engineers. PECASAE.

Tan Chin Tuan Fellowship (Singapore Nanyang Technological University),
Advance Fellow of Univ. of Washington and National Science Foundation (NSF),
John Simon Guggenheim Fellow,
IBM Faculty Award,
Fellow of American Physical Society
BASF Catalysis Faculty Award,
Fellow of the American Ceramic Society,
Avenessians Diversity Award from Columbia University
Very Important Parent from Luther Lee Emerson School in Demarest, NJ
Outstanding Woman Scientist Award, Women in Science, NYC,
DuPont Faculty Award,
Tau Beta Pi elected.
Sigma Xi elected.
Columbia Univ. Engr. School, Francis B.F. Rhodes Prize.

PUBLICATIONS

125+ publications with 90+ papers in referred journals.
See Scopus ID, ORCID and google scholar websites below

PRESENTATIONS

Delivered over 130 invited talks.

PATENTS

U. S. patent # 9,199,858 granted in Dec 2015, 'Methods for producing nanoparticles using palladium salt and uses thereof' with Hong Liang.

U.S. #7,820,596B2 awarded Oct 26, 2010, 'Thick Film High Temperature Superconducting Device Supporting High Critical Currents and Method for Fabricating Same.'

U.S. # 7,449,163 awarded Nov 11, 2008, 'Method for Preparing Nanoparticles comprising Cerium Oxide and Zirconium' With Feng Zhang.

U.S. # 7,320,732 awarded Jan. 22, 2008, 'Method for Preparing Atomistically Straight Boundary Junctions in High Temperature Superconducting Oxides.'

Prof. S.-W. Chan

September 2022

PATENTS

U.S. # 7,141,227 awarded Nov 28, 2006, 'Apparatus and Method for Preparing

Cerium Oxide Nanoparticles.'

U.S. # 5,087,608 awarded Feb. 11, 1992, 'Environmental Protection and Patterning of Superconducting Perovskites' with L.A. Farrow.

<https://patents.justia.com/inventor/siu-wai-chan>

*POST-Docs &
Students advised in
Research*

Research faculty advisor for 6 post-docs, 70 graduate students including 55+ terminal master's degree students and 60+ undergraduate students with their capstone senior research projects and summer research internships. Besides doctoral students, most master's degree and undergraduate students have been actively involved in our group research activities. Some are professors, e.g., Profs. Oratai Jongprateep of Kasetsart Univ., Q. Wei at Univ. of North Carolina and Papot Jaroenapibal of Khon Kaen University in Thailand. Drs. Robin Tichy of HP, Sung Joo Kim of UCI and P.P. Rodenbough at NYU-UAE. Most of them have had their first research and leadership experience with our group. As a few of them were presidents of the TMS MA, MRS, ACerS student chapters at Columbia with SWC as the faculty advisor. Some students and post-docs have become senior research scientists and directors of Fortune 500 companies, e.g. Drs Feng Zhang and Manoj Chopra at Western Digital, Jenna Pike at 3L, Larry Zhao at Applied Materials, Chunyan Tian at Apple and John Qin at Micron Technology. Also Dr. Evan Dellor of Eplan, Ms. Hening Liu of ASML and Mr. Johnny Lin of Lam Research.

<https://apam.columbia.edu/siu-wai-chan>

WEBSITES

<https://engineering.columbia.edu/faculty/siu-wai-chan>

<https://scholar.google.com/citations?user=n0MJCx0AAAAJ&hl=en>

<https://orcid.org/0000-0003-0482-9783>

[Scopus Author ID: 7404255242](https://orcid.org/0000-0003-0482-9783)

Size-dependent Properties of CeO_{2-y} Nanoparticles as studied by Raman Scattering, Jonathan E. Spanier, Richard D. Robinson, Feng Zhang, Siu-Wai Chan and Irving Herman, Phys. Rev. B. 64 245407 (2001) **1042** citations

Cerium oxide nanoparticles: size-selective formation and structure analysis, Feng Zhang, Siu-Wai Chan, Jonathan E. Spanier, Ebru Apak, Qiang Jin, Richard D. Robinson, and Irving Herman, Appl. Phys. Lett., 80, pp.127-129 (2002) **814** citations

Cerium and Yttrium Oxide Nanoparticles Are Neuroprotective, David R. Schubert, Richard Dargusch, Joan Raitano, and Siu-Wai Chan, Biochemical and Biophysical Research Communications, 342 pp 86-91 (2006) **801** citations

Cerium oxidation state in ceria nanoparticles using x-ray photoelectron spectroscopy and X-ray absorption near edge spectroscopy, Feng Zhang, Peng Wang, J. Koberstein, S. Khalid, and Siu-Wai Chan, Surface Science, 563, pp. 74-82 (2004) **607** citations

Ceria Nanoparticles: Size, Size Distribution and Shape, Feng Zhang, Qing Jin and Siu-Wai Chan, J. of Applied Physics, 95, pp. 4319-4326 (2004) **369** citations

Ionic Conductivities, Sintering Temperatures and Microstructures of Bulk Ceramic CeO₂ Doped with Y₂O₃, C. Tian, and Siu-Wai Chan, Solid State Ionic, 134, pp.89-102 (2000) **246** Citations

Phases in Ceria-Zirconia Binary Oxide (1-x)CeO₂-xZrO₂ Nanoparticles: The Particle-Size Effect, Feng Zhang, Chih-Hao Chen, Jonathan C. Hanson, Richard D. Robinson, Irving P. Herman, and Siu-Wai Chan, J. of Amer. Ceramics Soc., 89, pp 1028-1036, (2006) **181** Citations

Application of a Near Coincidence Site Lattice Theory to the Orientations of YBa₂Cu₃O_{7-x} Grains on (001) MgO Substrates, D.M. Hwang, T.S. Ravi, R. Ramesh, Siu-Wai Chan, C.Y. Chen, L. Nazar, X.D. Wu, A. Inam, and T. Venkatesan, Appl. Phys. Lett., 57 1690 (1990) **175** Citations

Structure Sensitivity of the Low-temperature Water-Gas Shift Reaction on Cu-CeO₂ Catalysts, Rui Si, Joan Raitano, Lihua Zhang, Siu-Wai Chan, Maria Flytzani-Stephanopoulos, Catalysis Today, 180, pp 68-80 (2012) **173** Citations

Formation of Stable Cu₂O from reduction of CuO nanoparticles, Jenna Pike, Siu-Wai Chan, Feng Zhang, X. Wang, Jonathan C. Hanson, Applied Catalysis A: General 303 pp. 273-277 (2006) **173** Citations

Madelung-Model Prediction for the Lattice Constant Scaling with the Size of Ionic Nanocrystals of CeO₂ and BaTiO₃, Vasili Perebeinos, Siu-Wai Chan and Feng Zhang, Solid State Communications, 123, Issues 6-7, pp. 295-297 (2002) **132** Citations

Epitaxy of Y-Ba-Cu-O thin films grown on single crystal of MgO, APL 56 p2243(1990) **115** Citations

Martensitic Phase Transformation of Isolated HfO₂, ZrO₂ and Hf_xZr_{1-x}O₂ (0<x<1) Nanocrystals, Jing Tang, Feng Zhang, Peter Zoogman, Jason Fabbri, Siu-Wai Chan, Yimei Zhu, Louis E. Brus, and Michael L. Steigerwald, Advanced Materials 15 pp.1595-1602 (2005) **108** Citations

Study of Energy versus Misorientation for Grain Boundaries in Gold by Crystallite Rotation Method--I. [001] Twist Boundaries, Siu-Wai Chan, and R.W. Balluffi, Acta Metallurgica, 33 1113 (1985) **106** Citations