Wei Wen Su
College of Tropical Agriculture and Human Resources
Department of Molecular Biosciences & Bioengineering
FTE Distribution: 25% I; 75% R; 0% E

Education

Degree	University	Major
BS	National Cheng Kung Univ., Tainan, Taiwan	Chemical Engineering
MSE	Johns Hopkins University, Baltimore, MD	Chemical Engineering
PhD	Lehigh University, Bethlehem, PA	Chemical Engineering

Professional Appointments

Title	Employer	Dates Employed
Assistant Professor (Biosystems Engineering)	University of Hawaii at Manoa	1991-1997
Associate Professor (Biosystems Engineering)	University of Hawaii at Manoa	1997-2000
Associate Professor (Molecular Biosciences & Bioengineering)	University of Hawaii at Manoa	2000-2003
Professor (Molecular Biosciences & Bioengineering)	University of Hawaii at Manoa	2003-Date

Courses Taught

Course Number and Title (credits)
BE260 Mass and Energy Balances (3 credits)
BE/MBBE460 Bioreactor Design and Analysis (3 credits)
MBBE/BE451 Synthetic Biology (3 credits)

Publications (reverse chronological order)

Refereed Journal Publications

1. Han, Z., Maruwan, J., Tang, Y.J., Su, W.W., 2023. Conditional protein degradation in *Yarrowia lipolytica* using the auxin-inducible degron. Frontiers in Bioengineering & Biotechnology, 2023, 11:1188119. doi:10.3389/fbioe.2023.1188119

2. Lim. J., Shin, M., Ha, T., Su, W.W., Yoon, J., Choi, J.W., 2023. A Nano-Biohybrid-Based Bio-Solar Cell to Regulate the Electrical Signal Transmission to Living Cells for Biomedical Application. Adv Mater., 35(41):e2303125. doi: 10.1002/adma.202303125. Epub 2023 Sep 11. PMID: 37435979.

3. Su, W.W., Zhang, B., Han, Z., Kumar, S., Gupta, M., 2022. Non-viral 2A-like sequences for protein coexpression. Journal of Biotechnology, 358, 1-8.

4. Worland, A.M., Czajka, J.J., Xing, Y., Harper, W.F., Moore, A., Xiao, Z., Han, Z., Wang, Y., Su, W. W., Tang, Y.J., 2020. Analysis of *Yarrowia lipolytica* growth, catabolism, and terpenoid biosynthesis during utilization of lipid-derived feedstock. Metabolic Engineering Communication, 11, e00130.

5. Li, N., Han, Z., O'Donnell, T.J., Kurasaki, R., Kajihara, L., Williams, P.G., Tang, Y.J., Su, W.W. 2020. Production and excretion of astaxanthin by engineered *Yarrowia lipolytica* using plant oil as both the carbon source and the biocompatible extractant. Applied Microbiology & Biotechnology, 104, 6977–6989.

6. Worland, A.M., Czajka, J.J., Li, Y., Wang, Y., Tang, Y.J., Su, W.W. 2020. Biosynthesis of terpene compounds using the non-model yeast *Yarrowia lipolytica*: grand challenges and a few perspectives. Current Opinion in Biotechnology, 64, 134-140.

7. Zhang, B., Han, Z.., Kumar, S., Gupta, M., Su, W.W. 2019. Intein-ubiquitin chimeric domain for coordinated protein coexpression. Journal of Biotechnology, 304, 38-43.

8. Han, Z., Park, A., Su, W.W. 2018. Valorization of papaya fruit waste through low-cost fractionation and microbial conversion of both juice and seed lipid. RSC Advances, 8, 27963-27972. DOI: 10.1039/C8RA05539D

9. Cho, H.Y., Lee, T., Yoon, Y., Han, Z., Rabie, H., Lee, K.B., Su, W.W., Choi, J.W. 2018. Magnetic oleosome as a functional lipophilic drug carrier for cancer therapy. ACS Appl. Mater. Interfaces. DOI: 10.1021/acsami.7b19255

10. Han, Z., Su, W.W. 2018. Intein-mediated assembly of tunable scaffoldins for facile synthesis of designer cellulosomes. Applied Microbiology & Biotechnology 102(3), 1331-1342.

11. Zhang, B., Rapolu, M., Kumar, S., Gupta, M., Liang, Z., Han, Z., Williams, P.G., Su, W.W. 2017. Coordinated protein co-expression in plants by harnessing the synergy between an intein and a viral 2A peptide. Plant Biotechnology Journal 15, 718-728.

12. Provera, M., Han, Z., Liaw, B.Y., Su, W.W. 2016. Electrochemical power generation from culled papaya fruits. J. Electrochem. Soc. 2016 163(7): A1457-A1459; doi:10.1149/2.0051608jes

13. Liang, Z., Zhang, B., Su, W.W., Williams, P.G., Li, Q. X. 2016. C-Glycosylflavones Alleviate Tau Phosphorylation and Amyloid Neurotoxicity through GSK3β Inhibition. ACS Chem. Neurosci., 7 (7), 912–923.

14. Watson, S.K., Han, Z., Su, W.W., Deshusses, M. A., Kan, E. 2016. Carbon dioxide capture using Escherichia coli expressing carbonic anhydrase in a foam bioreactor. Environmental Technology, 37(24), 3186-3192.

15. Zhang, B., Rapolu, M., Liang, Z., Han, Z., Williams, P.G., Su, W.W. 2015. A dual-intein autoprocessing domain that directs synchronized protein co-expression in both prokaryotes and eukaryotes. Scientific Reports 5, 8541; DOI:10.1038/srep08541.

16. Su, W.W. and Han, Z. 2013. Self-assembled synthetic protein scaffolds: biosynthesis and applications. *ECS Trans.* 50(28): 23-29.

17. Han, Z., Madzak, C., Su, W.W. 2013. Tunable nano-oleosomes derived from engineered *Yarrowia lipolytica*. *Biotechnol. Bioeng*. 110(3), 702-710.

18. Han, Z, Zhang, B., Wang, Y.E., Zuo, Y.Y., Su, W.W. 2012. Self-assembled amyloid-like oligomeric-cohesin scaffoldin for augmented protein display on the *Saccharomyces cerevisiae* cell surface. *Appl. Environ. Microbiol.* 78(9), 3249-3255.

19. Kubota, R., Alvarez, A.M., Su, W.W., Jenkins, D.M. 2011. FRET-based assimilating probe for sequence-specific real-time monitoring of loop-mediated isothermal amplification (LAMP). *Biological Engineering Transactions* 4(2), 81-100. Received the 2012 ASABE Superior Paper Award.

20. Yang, K., Jenkins, D.M., Su, W.W. 2011. Rapid concentration of bacteria using submicron magnetic anion exchangers for improving PCR-based multiplex pathogen detection. *J. Microbiological Methods* 86(1), 69-77.

21. Zhang, B., Rapolu, M., Huang, L., Su, W.W. 2011. Coordinate expression of multiple proteins in plant cells by exploiting endogenous kex2p-like protease activity. *Plant Biotechnology Journal* 9, 970-981.

22. Yang, K. & Su, W.W. 2011. Facile synthesis of metal-chelating magnetic nanoparticles by exploiting organophosphorous coupling. *Anal. Biochem.* 408(1), 175-177.

23. Yang, K., Xu, N.S., Su, W.W. 2010. Co-immobilized enzymes in magnetic chitosan beads for improved hydrolysis of macromolecular substrates under a time-varying magnetic field. *J. Biotechnol.* 148, 119-127.

24. Su, W.W. 2010. Bioreactors, Perfusion. In: Flickinger, M.C. (ed.) Encyclopedia of Industrial Biotechnology, pp. 978-993, Wiley, New York. (Invited book chapter contribution).

25. Jenkins, D.M., Zhu, C, Su, W.W. 2008. A simple hybrid circuit for direct determination of fluorescence lifetimes. *Applied Engineering in Agriculture.* 24(2):259-263.

26. Vardar-Schara, G., Krab, I.M., Yi, G., Su, W.W. 2007. A homogeneous fluorometric assay platform based on novel synthetic proteins. *Biochem. Biophys. Res. Commun*. 361, 102-108.

27. Peckham, G. D., Bugos, R.C., Su, W.W. 2006. Purification of GFP fusion proteins from transgenic plant cell cultures. *Protein Expr. Purif.* 49, 183-189.

28. Su, W.W. 2006. Bioreactor engineering for recombinant protein production using plant cell suspension culture. In: Dutta Gupta, S. and Ibaraki, Y. (eds.) Plant Tissue Culture Engineering. Springer, Berlin; pp. 135-159.

29. Su, W.W. and Lee, K.T. 2006. Plant cell and hairy-root cultures – process characteristics, products, and applications. In: Yang, S.T. (ed.) Bioprocessing for Value-Added Products from Renewable Resources: New Technologies and Applications, Elsevier, New York; pp. 263-292.

30. Su, W.W., Liu, B., Lu, W.B., Xu, N.S., Du, G.C., Tan, J.L. 2005. Observer-based online compensation of inner filter effect in monitoring fluorescence of GFP-expressing plant cell cultures. *Biotechnol. Bioeng.* 91(2), 213-226.

31. Su, W.W. 2005. Fluorescent proteins as tools to aid protein production. *Microbial Cell Factories* 4, 12.

32. Wang, M.L., Goldstein, C., Su, W.W., Moore, P.H., Albert, H.H. 2005. Production of biologically active GM-CSF in sugarcane: a secure biofactory. *Transgenic Research* 14, 167-178.

33. Parambam, R.I., Bugos, R., Su, W.W. 2004. Engineering green fluorescent protein as a dual functional tag. *Biotechnol. Bioeng.* 86(6), 687-97.

34. Su, W.W., Guan, P.Z., Bugos, R. 2004. High level of secretion of functional green fluorescent protein from transgenic tobacco cell cultures: characterization and sensing. *Biotechnol. Bioeng.* 85(6), 610-9.

35. Su, W.W., Li, J., Xu, N.S. 2003. State and parameter estimation of microalgal photobioreactor cultures based on local irradiance measurement. *J. Biotechnol.* 105(1,2), 165-178.

36. Su, W.W., Arias, R. 2003. Continuous plant cell perfusion culture: bioreactor characterization and secreted enzyme production. *J. Biosci. Bioeng.* 95(1), 13-20.

37. Li, J., Xu, N.S., Su, W.W. 2003. Online estimation of stirred-tank microalgal photobioreactor cultures based on dissolved oxygen measurement. *Biochem. Eng. J.* 14(1), 51-65.

38. Su, W.W. 2002. Bioprocess residence time distribution. In: Heldman, D. (ed.) Encyclopedia of Agricultural & Food Engineering. pp. 99 – 103. Dekkar, New York.

39. Su, W.W. 2002. Residence time distribution – biomedical, food, and environmental applications. In: Heldman, D. (ed.) Encyclopedia of Agricultural & Food Engineering. pp. 842 – 845. Dekkar, New York.

40. Zhang, J.N., Su, W.W. 2002. Estimation of intracellular phosphate content in plant cell cultures using extended Kalman filter. *J. Biosci. Bioeng.* 94 (1), 8-14.

41. Liu, S., Bugos, R., Dharmasiri, N., Su, W.W. 2001. Green fluorescent protein as a secretory reporter and a tool for process optimization in transgenic plant cell cultures. *J. Biotechnol.* 87 (1), 1-16.

42. Shi, H.D., Su, W.W. 2001. Display of green fluorescent protein on the *Escherichia coli* cell surface. *Enzyme & Microbial Technol.* 28, 25-34.

43. Chiou, S.Y., Su, W.W., Su, Y.C. 2001. Optimizing production of polyunsaturated fatty acids in *Marchantia polymorpha* cell suspension culture. *J. Biotechnol.* 85 (3), 247-257.

44. Su, W.W. 2001. Cell culture and regeneration of plant tissues. In: Hui, Y.H. (ed.) Handbook of Transgenic Food Plants. Dekkar, New York. Pp. 151-167.

45. Su, W.W. 2000. Perfusion bioreactors. In: Spier, R.E. (ed.) Encyclopedia of Cell Technology, Vol. 1, Wiley New York. pp. 230-242.

46. Su, W.W. 1999. Encapsulated plant cells: Techniques and applications. In: Kühtreiber, W.M., Lanza, R.P., Chick, W.L. (eds.) Handbook of Cell Encapsulation and Therapeutics. Birkhäuser, Boston. pp. 307-320.

47. Su, W.W. 1999. Bioreactor design for high-density plant cell cultures. Recent Research Developments in Biotechnology and Bioengineering, Vol. 2. Research Signpost, Trivandrum, India, pp. 235-253.

48. Su, W.W., Hwang, W.I., Kim, S.Y., Sagawa, Y. 1997. Induction of somatic embryogenesis in *Azadirachta indica*. *Plant Cell Tissue Organ Culture*, 50(2): 91-95.

49. Su, W.W., He, B.J. 1997. Secreted enzyme production by fungal pellets in a perfusion bioreactor. J. Biotechnol. 54: 43-52.

50. Su, W.W., He, B.J., Liang, H., Sun, S. 1996. A perfusion air-lift bioreactor for high-density plant cell cultivation and secreted protein production. *J. Biotechnol.* 50: 225-233.

51. Su, W.W., Lei, F., Kao, N.P. 1995. High-density cultivation of *Anchusa officinalis* in a stirred tank bioreactor with *in situ* filtration. *Appl. Microbiol. Biotechnol.* 44: 293-299.

52. Su, W.W. 1995. Bioprocessing technology for plant cell suspension cultures. *Appl. Biochem. Biotechnol.* 50: 189-230.

53. Su, W.W. 1995. *In situ* filtration of *Anchusa officinalis* culture in a cell-retention stirred tank bioreactor. *Biotechnol. Tech.* 9: 259-264.

54. Su, W.W., Asali, E.C., Humphrey, A.E. 1994. *Anchusa officinalis*: Production of rosmarinic acid in perfusion cell cultures. In Bajaj, Y.P.S. (ed.), Biotechnology in Agriculture and Forestry, Vol. 26, Medicinal and Aromatic Plants VI. Springer-Verlag, Berlin, pp. 1-20.

55. Su, W.W., Lei, F. 1993. Rosmarinic acid production in perfused *Anchusa officinalis* culture: Effect of inoculum size. *Biotechnol. Lett.* 15: 1035-1038.

56. Su, W.W., Lei, F., Su, L.Y. 1993. Perfusion strategy for rosmarinic acid production by *Anchusa officinalis*. *Biotechnol. Bioeng.* 42: 884-890.

57. Su, W.W., Humphrey, A.E. 1992. Production of plant secondary metabolites from high-density perfusion cultures. In Furusaki, S., Endo, I., Matsuno, R. (eds.), Biochemical Engineering for 2001. Springer-Verlag, Tokyo, pp. 266-269.

58. Su, W.W., Caram, H.S., Humphrey, A.E. 1992. Design of tubular microporous membrane-aerated bioreactors for plant cell cultures. In Furusaki, S., Endo, I., Matsuno, R. (eds.), Biochemical Engineering for 2001. Springer-Verlag, Tokyo, pp. 302-305.

59. Su, W.W., Caram, H.S., Humphrey, A.E. 1992. Optimal design of the tubular microporous membrane aerator for shear sensitive cell cultures. *Biotechnol. Prog.* 8: 19-24.

60. Su, W.W., Humphrey, A.E. 1991. Production of rosmarinic acid from perfusion culture of *Anchusa officinalis* in a membrane-aerated bioreactor. *Biotechnol. Lett.* 13: 889-892.

61. Su, W.W., Humphrey, A.E. 1990. Production of rosmarinic acid in the high-density perfusion culture of *Anchusa officinalis* using a high sugar medium. *Biotechnol. Lett*. 12: 793-798.

62. Malik, B., Su, W.W., Wald, H.L., Blumentals, I.I., Kelly, R.M. 1989. Growth and gas production for hyperthermophilic archaebacterium, *Pyrococcus furiosus*. *Biotechnol. Bioeng.* 34: 1050-1057.

63. Paramswaran, A.K., Su, W.W., Schicho, R.N., Provan, C.N., Malik, B., Kelly, R.M. 1988. Engineering considerations for growth of bacteria at temperatures around 100°C. *Appl. Biochem. Biotechnol.* 18: 53-73.

64. Su, W.W., Kelly, R.M. 1988. Effect of hyperbaric oxygen and carbon dioxide on heterotrophic growth of the extreme thermophile *Sulfolobus acidocaldarius*. *Biotechnol. Bioeng*. 31: 750-754.

Creative Works (i.e., Extension Videos, Websites, Blogs, Creative Designs and Exhibitions, etc.)

Issued patents:

- Su, W.W., Zhang, B. 2015. Auto-processing domains for polypeptide expression. US patent 8,945,876, issued 2/3/2015.
- Su, W.W. 2010. Cooperative reporter systems, components, and methods for analyte detection. US patent 7,741,128, issued 6/22/2010.
- Su, W.W. 2007. Sensor constructs and detection methods. US patent 7,247,443, issued 7/24/2007.
- Chang, S., Christopher, D., Vine, B., Su, W.W., Bugos, R. 2006. Plasmodium falciparum merozoite surface protein-1 malaria vaccine produced in transgenic plants. US Patent 7,037,681, issued 5/2/2006.
- Su, W.W. 1994. External-loop perfusion air-lift bioreactor. US Patent 5,342,781, issued 8/30/1994.

Leadership Roles (Committees, Boards, Advisory, etc.)

- University of Hawaii College of Tropical Agriculture & Human Resources (CTAHR) Dean's Advisory Board (1998)
- University of Hawaii Research Council (1998)
- Research Advisory Committee for the NSF-funded Marine Bioproducts Engineering Center (MarBEC) (2000)
- Editorial board, *Scientific Reports*, Nature Research, 2015 – date
- ABET committee for the 2021 BE program review (served as co-coordinator; 2021)
- Lead on developing the MOU between CTAHR and CoE to strengthen collaboration and increase BE enrollment (signed in 2022)
- Chair of the MBBE Faculty Search Committee for the Bioprocess Engineering Assistant Professor position (2023)
- Review editor, *Frontiers in Bioengineering & Biotechnology*, Frontiers, 2023 – date

Supervised Students

Category	Current Number of Students	Number Graduated (Career)
Chair of Master's Committees	3	19
Chair of PhD Committees	-	5
Member of Master's Committees	1	29
Member of PhD Committees	4	26
Advisor of postdoctoral fellows	1	14
Supervisor of student lab assistant	1	>20
Mentor for undergraduates	2	17

Grant Support (since 2010)

Upgrading Black Soldier Fly Larvae Meal for Aquatic Feeds Using a Sustainable Microbial Process, Year 2 - supplemental grant
USDA CTSA
$22,687
2023
PI

Value-added products from renewable feedstock via innovative bioprocessing and metabolic engineering
FY24 CTAHR internal grant support
$10,764
2023-2024
PI

Engineering synthetic control of protein degradation in cells
UH Faculty Mentoring Grant for Summer Undergraduate Research and Creative Works
$8,000
2023
PI

Sustainable bioprocessing research
Vedan Enterprise Corp. Taiwan
$47,982
2022-2023
PI

Value-added products from renewable feedstock via innovative bioprocessing and metabolic engineering
FY23 CTAHR Internal Funding Opportunity grant
$28,140
2022-2023

PI

3D-printing enabled low-cost microfabrication for rapid optimization of waste-valorization bioprocesses
microfabrication for rapid optimization of waste-valorization bioprocesses
UH Faculty Mentoring Grant for Summer Undergraduate Research and Creative Works
$5,000
2022
PI

Value-added products from renewable feedstock via innovative bioprocessing and metabolic engineering
FY22 CTAHR Internal Funding Opportunity grant
$32,140
2021-2022
PI

Upgrading black soldier fly larvae meal for aquatic feeds using a sustainable microbial process
USDA CTSA
$110,000
2021-2023
PI

RNA-seq analysis of *Yarrowia lipolytica* to decipher synthesis of acetyl-CoA derived oleochemicals from waste lipid feedstock for biomanufacturing of biofuels and bioproducts
DOE, JGI
$27,600 (estimate: 92 RNAseq samples at $300/sample)
2021-2022
PI

Engineering a yeast biorefinery utilizing renewable oil feedstock from agricultural wastes for high-value oleochemical production
USDA NIFA AFRI
$435,000
2020-2023
PI

Instant biofumigation using natural products from papaya seed waste for sustainable management of soil-borne plant pathogens
USDA Western SARE
$349,995
2020-2023
PI

Development of a novel low-cost enzyme-catalyzed oxygenation system for enhanced valorization of agricultural byproducts via microbial conversion
University of Hawaii Manoa Faculty Mentoring Grant for Summer Undergraduate Research and Creative Works
$5,000
2020
PI

Improving cost-effectiveness of producing local aquatic feed from papaya fruit wastes via innovative bioprocessing
USDA CTSA
$75,000
2018-2021
PI

Plant and protein biotechnology research

UH Foundation
$80,000
2016-2025
PI

Developing controlled-release antimicrobial products from papaya seed waste
USDA Hatch Supplemental
$68,000
2017-2019
PI

Microbial conversion of waste lipids
Univ. Hawaii (undergrad research mentoring grant)
$4,980
2019
PI

Waste papaya seed oil as emerging feedstock for producing animal feed and biofuel
USDA ARS
$177,339
2015-2019
PI

Development of a proprietary gene-stacking technology for crops
Dow Agrosciences
$156,954
2014-2017
PI

A novel enabling technology for advancing basic biomedical discoveries and synthesis of protein therapeutics
Hawaii Community Foundation
$50,000
2014-2016
PI

Electrochemical conversion of papaya waste
USDA-ARS
$101,361
2014-2015
PI

Bioengineering surfactant-like proteins for agricultural biotechnology applications
USDA-Hatch Supplemental
$50,000
2014-2016
PI

Natural whole-cell oil microcapsules as innovative enrichment diets for live feeds
USDA CTSA
$63,500 (Su: $50,000)
2013-2015
PI

Development of a proprietary gene-stacking technology for crops
Dow Agrosciences
$22,000

2012-2014
PI

A new technology for gene stacking in plants
USDA-Hatch Supplemental
$44,000
2011-2013
PI

Multifunctional oleosomes as nanocarriers for cancer therapy
Hawaii Community Foundation
$50,000
2011-2013
PI

Development of a proprietary nanoparticle mixing technology
Millipore Co.
$8,000
2011
PI

Cooperative synthesis of cellulosomes by an engineered yeast consortium to improve lignocellulose bioconversion
USDA-AFRI
$150,000
2010-2013
PI

Selected Recent Presentations at Conferences (* presenter)

Title: Engineering A Yeast Biorefinery Utilizing Renewable Oil Feedstock from Agricultural Wastes for High-value Oleochemical Production
Authors: Wei Wen Su*
Name of Conference: USDA NIFA 2023 Bioeconomy Project Director Meeting
Location: Kansas City, MO
Date of Presentation: 07/13/2023

Title: Using a conditional degron system to elucidate and rewire regulation of terpenoid biosynthesis in *Yarrowia Lipolytica* utilizing renewable glucose and oil feedstocks
Authors: Jessica Maruwan*, Zhenlin Han, Solange Tofani, Wei Wen Su
Name of Conference: S-1075 Multistate Annual Meeting and the Symposium on Science and Technology Driving the Bioeconomy - 2023
Location: Omaha, NE
Date of Presentation: 07/13/2023

Title: Integrative Omics Analysis of *Yarrowia Lipolytica* for the Bioconversion of Lipid-Based Substrates
Authors: Alyssa M. Worland*, Zhenlin Han, Jeffrey Czajka, Yinjie Tang, Wei Wen Su
Name of Conference: 2022 Annual Meeting of the American Institute of Chemical Engineers (AIChE); Metabolic platform development – non-conventional species and systems
Location: Phoenix, AZ
Date of Presentation: 11/16/2022

Title: Advances in Plant Cell Culture Engineering
Authors: Wei Wen Su*
Name of Conference: Korean Society for Biotechnology and Bioengineering (KSBB) 2018 Annual Meeting; Nanobiotechnology & Cell Engineering II (keynote speaker)
Location: Seoul, Korea

Date of Presentation: 10/10/2018