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Professor

Diploma in Chemical Engineering
National Taipei Institute of Technology, 1982
M.Sc. in Chemical Engineering
National Taiwan University, 1986
M.Sc. in Materials Science
University of Wisconsin-Madison, 1989
Ph.D. in Materials Science
University of Wisconsin-Madison, 1991

Research and Professional Interests
Crystal Growth
Solar silicon material
Modeling and simulation
Semiconductor Solar Cells and Materials
Transport Phenomena

Journal Papers

1. **C.W. Lan**, A. Lan, C.F. Yang, H.P. Hsu, M. Yang, A. Yu, B. Hsu, W.C. Hsu, A. Yang, The emergence of high-performance multi-crystalline silicon in photovoltaics, *J. Cryst. Growth* 468 (2017) 17-23 (SCI, EI)

2. C.Y. Lan, Y.C. Wu, A. Lan, C.F. Yang, C. Hsu, C.M. Lu, A. Yang, **C.W. Lan**, Control of ingot quality and solar cell appearance of cast mono-like silicon by using seed partitions, *J. Cryst. Growth* 475 (2017) 136-143 (SCI, EI)

3. H.K. Lin, **C.W. Lan**, Phase field modeling of grain structure evolution during directional solidification of multi-crystalline silicon sheet, *J. Cryst. Growth* 475 (2017) 150-157 (SCI, EI)

4. H.K. Lin, **C.W. Lan**, Revisiting the twinning mechanism in directional solidification of multi-crystalline silicon sheet, *Acta Mater.* 131 (2017) 1-10 (SCI, EI)

5. G.Y. Chen, **C.W. Lan**, Understanding the facet formation mechanisms of Si thin-film solidification through three-dimensional phase-field modeling, *J. Cryst. Growth* 474 (2017) 166–170 (SCI, EI)

6. S. P. Phang, H. C. Sio, C. F. Yang, **C. W. Lan**, Y. M. Yang, Andy W. H. Yu, Bruce S. L. Hsu, Chuck W. C. Hsu, and D. Macdonald, N-type high-performance multicrystalline and mono-like silicon wafers with lifetimes above 2 ms, *Jpn. J. Appl. Phys.* 56 08MB10

7. H.K. Lin, **C.W. Lan**, A multilayer nucleation model for twinning during directional solidification of multi-crystalline silicon, *J.Cryst. Growth* 478 (2017) 47–51 (SCI, EI)

8. T. Jain, H.K. Lin, **C.W. Lan**, Three dimensional modelling of grain boundary interaction and evolution during directional solidification of multi-crystalline silicon, *J. Cryst. Growth* 485 (2018) 8-18 (SCI, EI)

9. T. Jain, H.K. Lin, **C.W. Lan**, Twinning mechanism at three-grain tri-junction during directional solidification of multi-crystalline silicon, *Acta Mater.* 144 (2018) 41-50 (SCI, EI)

10. J. W. Jhang, T. Jain, H. K. Lin, and **C. W. Lan**, Possible twinning operations during directional solidification of multicrystalline silicon, *Cryst. Growth Des.* 18 (2018) 2518-2524 (SCI, EI)

11. T-J. Liao, Y.S. Kang, **C.W. Lan**, In situ observation of crystal/melt interface and infrared measurement of temperature profile during directional solidification of silicon plate, *J. Cryst. Growth*, 499 (2018) 90-97 (SCI, EI)

12. H.L. Yang, I.T. Liu, C.E. Liu, H.P. Hsu, **C.W. Lan**, Recycling and reuse of kerf-loss silicon from diamond wire sawing for photovoltaic industry, *Waste Management*, 84 (2019) 204-210 (SCI, EI)

13. A. Lan, C.E. Liu, H.L. Yang, H.T. Yu, I.T. Liu, H.P. Hsu, **C.W. Lan,** Silicon ingot casting using reusable silicon nitride crucibles made from diamond wire sawing kerf-loss silicon, *J. Cryst. Growth*, 525 (2019) 125184 (SCI, EI)

14. J.W. Jhang, **C.W. Lan**, Three-dimensional phase field modelling of twin nucleation during directional solidification of multi-crystalline silicon, *J. Cryst. Growth*, 520 (2019) 33−41 (SCI, EI)

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20. Subbiramaniyan Kubendhiran, Gavin Sison, Hsiao Ping Hsu, **Chung-Wen Lan**, Copper Assisted Inverted Pyramids Texturization of Monocrystalline Silicon in a Nitrogen Bubbling Bath for Highly Efficient Light Trapping, *Silicon* (2020), https://doi.org/10.1007/s12633-020-00650-8

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Conference Papers

1. **C.W. Lan**, Recent progress of high performance multi-crystalline silicon for photovoltaic industry, SNEC 2017, Apr. 17-20, 2017, Shanghai. (plenary speech)

2. H.K. Lin, **C.W. Lan**, Phase field modeling of grain structure evolution during directional solidification of multi-crystalline silicon sheet, ACCGE21, Jul. 30-Aug. 4, 2017, Santa Fe, New Mexico, USA. (invited speech)

3. H.K. Lin, **C.W. Lan**, Revisiting the twinning mechanism in directional solidification of multi-crystalline silicon sheet, ACCGE21, July 30 - August 4, 2017, Santa Fe, New Mexico, USA.

4. C. Y. Lan, Y.C. Wu, W.C. Lan, C.F. Yang, W.C. Hsu, C.M. Lu, A. Yang, **C.W. Lan**, Control of ingot quality and cell appearance for mono-like silicon casting by using seed partitions, EUPVSEC 2017, Sep. 25 – 29, Amsterdam, The Netherlands.

5. C. Y. Lan, C.F. Yang, A. Lan, C. Hsu, A. Yang, **C.W. Lan**, Reusable Si_3N_4 crucibles made from kerf-loss silicon for multi-crystalline silicon growth, EUPVSEC 2017, Sep. 25 – 29, Amsterdam, The Netherlands.

6. **C.W. Lan**, Recent progress and challenges of cast silicon for photovoltaic industry, PVSEC 27, Nov. 12-17, Japan. (invited speech)

7. Y. Z. Liu, C. Y. Lan, C.F. Yang, A. Lan, C. Hsu, **C.W. Lan**, Reusable Si_3N_4 crucibles made from kerf-loss silicon for multi-crystalline silicon growth, PVSEC 27, Nov. 12-17, Japan.

8. Han-Lin Yang, I-Tseng Liu, **Chung-Wen Lan**, Recovery of kerf-loss silicon from diamond wire sawing, CSSC10, Apr. 8-11, 2018, Japan.

9. Pei-Yu Sun, Pi-Chen Tsai, Hsiao-Ping Hsu, A. Sutejo, A. Yang, **Chung-Wen Lan**, Green black silicon texturing for multi-crystalline silicon wafer, CSSC10, Apr. 8-11, 2018, Japan.

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13. **C.W. Lan**, P.Y. Sun, H.P. Hsu, A. Yang, Recent Progress and challenges of casting technology for silicon, CSSC10, Apr. 8-11, 2018, Japan. (invited speech)

14. **C.W. Lan**, Recent progress and challenges of casting technology for silicon photovoltaics, SNEC, May26-30, 2018, China. (invited speech)

15. P.Y. Sun, P.C. Tsai, H.P. Hsu, A. Sutejo, A. Yang, **C.W. Lan**, Green black silicon texturing for multi-crystalline silicon wafer, Jun. 9-17, 2018, USA.

16. P.Y. Sun, P.C. Tsai, H.P. Hsu, A. Sutejo, A. Yang, **C.W. Lan**, Green black silicon texturing for multi-crystalline silicon wafer, EUPVSEC, Sep.22-28, 2018, Belgium.

17. **C.W. Lan**, Bulk crystal growth from the melt, the summer school of crystal growth

Jul.21-22, 2018, China. (invited speech)

18. **C.W. Lan**, High-Performance Multi-crystalline Silicon, CCCG-18, Jul. 23-25, 2018, China. (invited speech)

19. T. Jain, H.K. Lin, J.W. Jhang, **C.W. Lan**, Phase field modeling of grain boundary interaction and evolution during directional solidification of multi-crystalline silicon, IWMCG-9, Oct. 20-25, 2018, USA. (invited speech)

20. **C.W. Lan**, High performance multi-crystalline silicon and beyond, MRS, Nov. 23-30,2018, USA. (invited speech)

21. **C.W. Lan**, High performance multi-crystalline silicon and beyond, MRS, Nov. 23-30,2018, USA. (invited speech)

22. **C.W. Lan**, Bulk cystal growth from the melt, 17th International summer school on crystal growth, Jul. 21-27, 2019, USA. (invited speech)

23. C.E. Liu, H.T. Yu, H.L. Yang, **C.W. Lan**, Silicon ingot growth from nitride crucibles made from kerf-loss silicon during diamond wire sawing, ICCGE-19, Jul. 27-Aug. 2, 2019, USA.

24. V.L. Jr, **C.W. Lan**, In situ observation of the solidification interface and grain boundary development of two silicon seeds with simultaneous measurement of temperature profile and undercooling, ICCGE-19, Jul. 27-Aug. 2, 2019, USA.

25. H.L. Yang, **C.W. Lan**, Study of dip casting for multi-crystalline silicon, ICCGE-19, Jul. 27-Aug. 2, 2019, USA.

26. C.E. Liu, H.T. Yu, H.L. Yang, **C.W. Lan**, Silicon ingot growth from nitride crucibles made from kerf-loss silicon during diamond wire sawing, EUPVSEC, Sep. 9-13, 2019, France.

27. A. Sutejo, H.P. Hsu, **C.W. Lan**, Texturing monocrystalline silicon wafer to generate inverted pyramid, EUPVSEC, Sep. 9-13, 2019, France.

28. S. Kubendhiran, H.P. Hsu, **C.W. Lan**, Metal assisted micro-scale inverted pyramids texturization of monocrystalline silicon for highly efficient light trapping, TwIChE, Nov. 8-9, 2019, Taiwan.

29. Victor Lau Jr, K. Maeda, K. Fujiwara, and **C.W. Lan**, In situ observation of the solidification interface and grain boundary development of two silicon seeds with simultaneous measurement of temperature profile and undercooling, TwIChE, Nov. 8-9, 2019, Taiwan.

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33. Subbiramaniyan K., Gavin S., H. P. Hsu, C. W. Lan, Copper Assisted Texturization Technique For High Effieciency Monocrystalline Silicon Solar Cells, PVSEC 2020.

34. Gavin S., C. W. Lan, In Situ Solidification Study of Si1-XGeX Alloy for

Thermoelectric Applications, 2020TwIChE 2020.

35. Nai-wei Yang, Chung-wen Lan, Scalable synthesis of Porous Silicon from Kerf Loss Waste as Anode Material for Lithium-ion Batteries, 2020TwIChE 2020.

36. G. Sison, C.W. Lan, *In situ* Solidification Study of $Si_{1-X}Ge_x$ Alloy for Thermoelectric Applications, ACCGE-22 (2021)

37. P.T. Chiang, C.W. Lan, *In Situ* Visualization of Traveling Solvent Growth of Thin $Si_{1-X}Ge_x$ Crystals, ACCGE-22 (2021)

38. C.W. Lan, Challenges in Modeling of Grain Structures for Multi-Crystalline Silicon Casting, ACCGE-22 (2021)

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2. **C.W. Lan,** Multiplicity and flow bifurcations in bridgman and zone-melting crystal growth, in "*Studies on flow instabilities in bulk crystal growth*" Edited by A. Gelfgat, Research Signpost, 2008.

3. **C.W. Lan**, Convections and control in melt growth of crystals, in Ch. 36 of "*Handbook of Crystal Growth*" edited by G. Dhanaraj, K. Byrappa, V. Prasad, and M. Dudley, Springer, 2010.

4. **C.W. Lan**, C. Hsu, K. Nakajima, Multi-crystalline silicon crystal growth for photovoltaic applications, in Ch. 10 of "*Handbook of Crystal Growth*" Vol. II. edited by T. Nishinaga, P. Rudolph, 2015.

5. **C.W. Lan**, Growth of multicrystalline silicon: The high-performance casting method, in Ch. 8 of "*Handbook of Photovoltaic Silicon*" edited by Deren Yang, 2017.

Patents

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growth, **Patent number:** 5217565, 1993.

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8. 徐文慶, 謝兆坤, 吳文欽, 曾榮琳, 張義洲, 陳子齡, **藍崇文**, 增強長晶效率之長晶裝置, 中國專利, CN03207827.7, 2004.

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14. 謝兆坤, **藍崇文**, 王興邦, 徐文慶, 具熱帷幕之長晶爐熱場結構, 中華民國專利新型, M268357, 2005-2024.

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17. **Lan; Chung-Wen**, Lin; Yen-Chih, Wang; Teng-Yu, Tai; Yi-Der, Recovery Method of

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22. 崔孟晉, **藍崇文**·蔡松雨, 用於染料敏化太陽能電池的電解液及其製造方法以及使用此電解質的染料敏化太陽能電池, 中華民國專利, 案號 096151546 號, filed, 2007.

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138. **藍崇文**, 蔡弼丞, 楊家福, 許曉萍, 針對矽晶圓之製絨方法及執行該方法之製絨設備, 中華民國專利發明型, I666353, 2019/07~2038/01.

139. **藍崇文**, 針對矽晶圓之經製絨的表面上孔洞之擴孔方法, 中華民國專利發明型, I675126, 2019/10~2038/02.

140. **藍崇文**, 製造一氧化矽沉積物之方法及執行該方法之製造設備, 公開號 202009215

141. **藍崇文**, 以矽泥廢料製造一氧化矽沉積物之方法, 中華民國專利發明型, I741247, 2021/10/01~2039/01/02

142. **藍崇文**, 製造氮化矽坩堝之方法, 中華民國專利發明型, I702315, 2020/08/21~2039/05/07

143. **藍崇文**, 製造多孔矽顆粒之方法及執行該方法之製造設備, 中華民國專利發明型, I723730, 2021/04/01~2040/01/09

144. **藍崇文**, 製造多顆氧化矽顆粒之方法, 中華民國專利發明型, I737303, 2021/08/21~2040/05/17

145. **藍崇文**, 製造多顆被覆碳層的一氧化矽顆粒之方法, 中華民國專利發明型, I736268, 2021/08/11~2040/05/17

146. **藍崇文**, 製造二氧化矽顆粒之方法, 中華民國專利發明型, I726724, 2021/05/01~2040/05/07

147. **藍崇文**, 以矽泥廢料製造高模數水玻璃之方法, 中華民國專利發明型, I741683, 2021/10/01~2040/07/15

148. **藍崇文**, 針對單晶矽晶圓的表面之倒金字塔結構製絨化方法, 中華民國專利發明型, I792400, 2023/02/11~2041/07/08

149. **藍崇文**, 用於生產矽氧材料的連續式設備, 中華民國專利新型, M637377, 2023/02/11~2032/08/11

Technology Transfer

1. 自動化單晶提拉技術, 3,467,165 元, 中美矽晶, 12/11/2006

2. High Efficiency Solar Silicon Directional Solidification Technology, 1,000,000 元，中美矽晶，11/01/2009.

3. High Efficiency Solar Silicon Directional Solidification Technology, 660,000 元，中美矽晶，11/01/2010.

4. High Efficiency Solar Silicon Directional Solidification Technology, 660,000 元，中美矽晶，11/01/2011.

5. 太陽能 N 型高效多晶與類單晶鑄碇關鍵技術開發, 645,000 元，中美矽晶，

02/01/2014.

6. 太陽能 N 型高效多晶與類單晶鑄碇關鍵技術開發，645,000 元，中美矽晶，02/01/2015.

7. 太陽能 N 型高效多晶與類單晶鑄碇關鍵技術開發，645,000 元，中美矽晶，02/01/2016.

Honors and Others

1. 2022 PVSEC Award, 太陽光電領域全球三大國際會議之一

2. 2021 有庠綠能科技講座

3. 2020 臺北科技大學傑出校友

4. 2020 傑出人才基金會傑出人才講座

5. 2019 年傑出人才發展基金會之「傑出人才講座」。

6. 2019 年台大化工系陳芳燦講座。

7. 2019 年台灣化工學會的會士。

8. 2017 年在台灣太陽光電產業協會的推薦下，也榮獲亞洲光伏協會兩年一評的『技術成就獎』。

9. 2017 宗倬章講座教授。

10. 2016 ICCGE 世界長晶學會最高榮譽 Laudise Prize，IOCG 每三年評獎一次，Laudise Prize 是獎勵技術貢獻者。

11. 2016 第 23 屆東元獎。

12. 105 年國家發明創作獎的發明銀牌獎。

13. Best Presentation Award, The 26th International Photovoltaic Science and Engineering (PVSEC-26), Singapore 2016.

14. Plenary Speaker, The 25th International Photovoltaic Science and Engineering (PVSEC-25), Busan, Korea 2015 (also member of International Advisory Committee of PVSEC).

15. Conference co-chair, The 6th International Workshop on Crystal Growth technology, Jun. 14-20, 2014, Berlin, Germany

16. Conference Chair, The 23th International Photovoltaic Science and Engineering (PVSEC-23), 2013, Taipei (also member of International Advisory Committee of PVSEC).

17. 指導學生楊家福同學參加 IUMRS-ICEM 2014 獲得最佳海報獎

18. 臺灣大學終身特聘教授 (2013-)

19. Conference Chair, the 7th International Workshop on Modeling in Crystal Growth, Oct. 28-31, 2012, Taipei (Co-Chair of 4th International Workshop on Modeling in Crystal Growth, Fukuoka, Japan, Oct. 5-7, 2003) (also member of Advisory Committee of the International Conference in Crystal Growth (ICCG) 2013 in Warsaw, Poland and 2016 Nagoya, Japan).

20. 指導學生林華愷同學參加 IWMCG7 獲得最佳海報獎

21. Plenary Speaker, 2nd International Conference on Materials for Energy - EnMat II, May 12-16, 2013, Karlsruhe Germany.

22. Plenary Speaker, 27th European PV Solar Energy Conference and Exhibition - EUPVSEC, Development of High-Quality Multi-crystalline Silicon for PV, Sep. 24-28, 2012, Frankfurt, Germany.

23. 2011 台灣化學工程學會金開英獎

24. Associate Editor, Journal of Crystal Growth, (2011- now).

25. Guess Editor, Special Issue in High Efficiency Silicon Solar Cells for J. of Photoenergy (2011).

26. International Editor, Korean Journal of Crystal Growth, (2001-now)

27. 2010 中國工程師學會傑出工程教授獎

28. 臺灣大學特聘教授 (2007-2013)

29. 台灣太陽光電產業協會創會終身名譽理事長 (2010-now)

30. SEMI Taiwan, PV Committee, Vice Chairman (2008-2012)

31. 國科會傑出研究學者研究計畫主持人(2008-2011)

32. 台灣太陽光電產業協會第一任及第二任理事長 (2007-2010)

33. 工研院太陽光電中心主任(2007-2010)

34. Associate Editor in Chief, J. ChIChE, (2000-2009).

35. 2008, 2009, 2010, 2011 台灣 SEMI 委員會貢獻獎

36. 2008 台灣化學工程學會賴再得獎

37. Editor, Fluid Dynamics and Materials Processing, 2005-2007.

38. 國科會傑出研究獎, (2004-2007).

39. 亞洲晶體生長科學與技術協會第四任主席(2005-2007)

International Cooperation Project (started from 2022)

1. 台俄雙邊合作計畫(協同主持人), 2005/8/1~2008/7/31.
2. 台法雙邊幽蘭計畫(主持人), 2006/8/1~2007/7/31
3. 台法雙邊幽蘭計畫(主持人), 2016/1/1~2017/12/31