國立高雄科技大學光電工程研究所

光電半導體元件研究室

實驗室網頁:尚無

實驗室指導教授：陳國峰 老師

教師辦公室位置：資訊大樓 10 樓 / 分機：15716

學生研究室位置：資訊大樓 10 樓

實驗室簡介：

本實驗室成立宗旨在於為透過半導體製程技術達成對光電半導體元件之研究。本實驗室之研究著力於太陽能電池元件的模擬、設計分析，訓練學生專業素養與研發能力，期許以培養學生對半導體及光電產業相關製程技術之了解。歷屆畢業學生多服務於相關科技產業，包含日月光、昱晶能源科技等，學生表現備受業界雇主肯定。

研究領域：

- 薄膜型太陽能電池
- 微晶型太陽能電池
- 串接型太陽能電池
- 異質結構型太陽能電池
- 銦鎵氮太陽能電池

實驗室成員：

指導老師

姓名：陳國峰
學歷：美國伊利諾大學香檳分校電機博士
經歷：旭能光電 研發部 副理
專長：太陽能電池、電漿/場發顯示器技術、發光二極體、半導體雷射

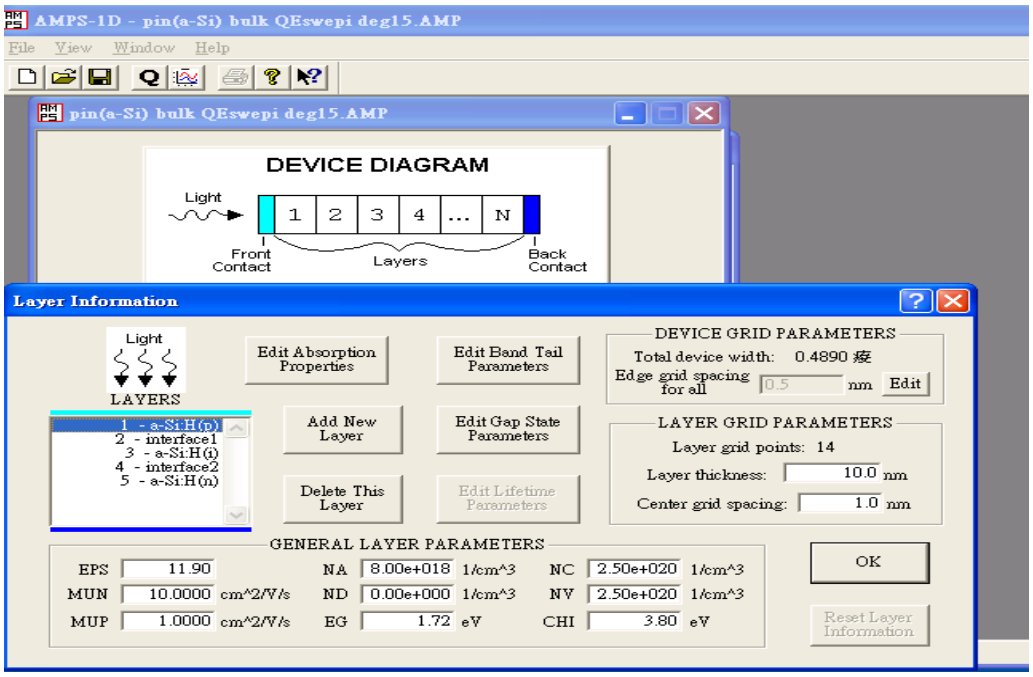
歷屆畢業學生

畢業年度	研究生	級別	論文名稱
102	張志維	碩士	同異質接面混型結構矽太陽能電池
102	王俊傑	碩士	銅銦鎵硒太陽能電池能隙優化模擬
102	王偉如	碩士	超高轉換率中間能隙帶銦鎵氮太陽能電池之模擬研究
103	黃創元	碩士	光譜轉換機制對矽太陽能電池之影響
104	施仲勳	碩士	N 型摻雜基底同異質接面混型結構矽太陽能電池
104	洪健倫	碩士	具中間能隙之銦鎵氮串接型太陽能電池
104	陳柏鈞	碩士	中間能帶矽太陽能電池之模擬研究

儀器設備與軟體：

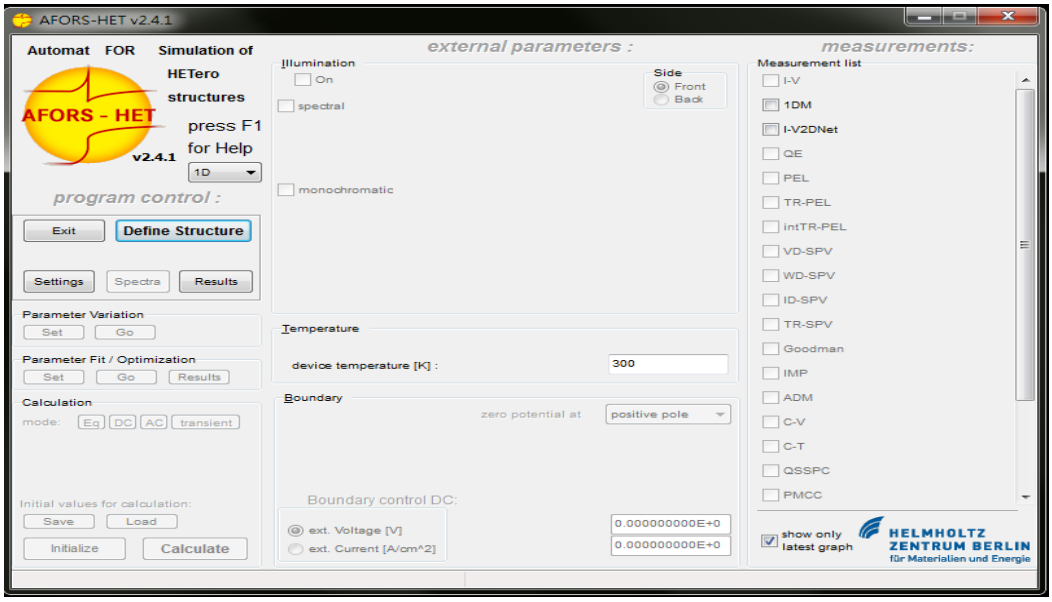
一、模擬軟體: AMPS-1D

AMPS-1D(A one-dimensional device simulation program for the Analysis of Microelectronic and Photonic Structures, AMPS-1D)為一種相當普遍並且且功能多元的電腦模擬工具，經常被用來分析光電元件的物理特性與結構設計的一維分析軟體。



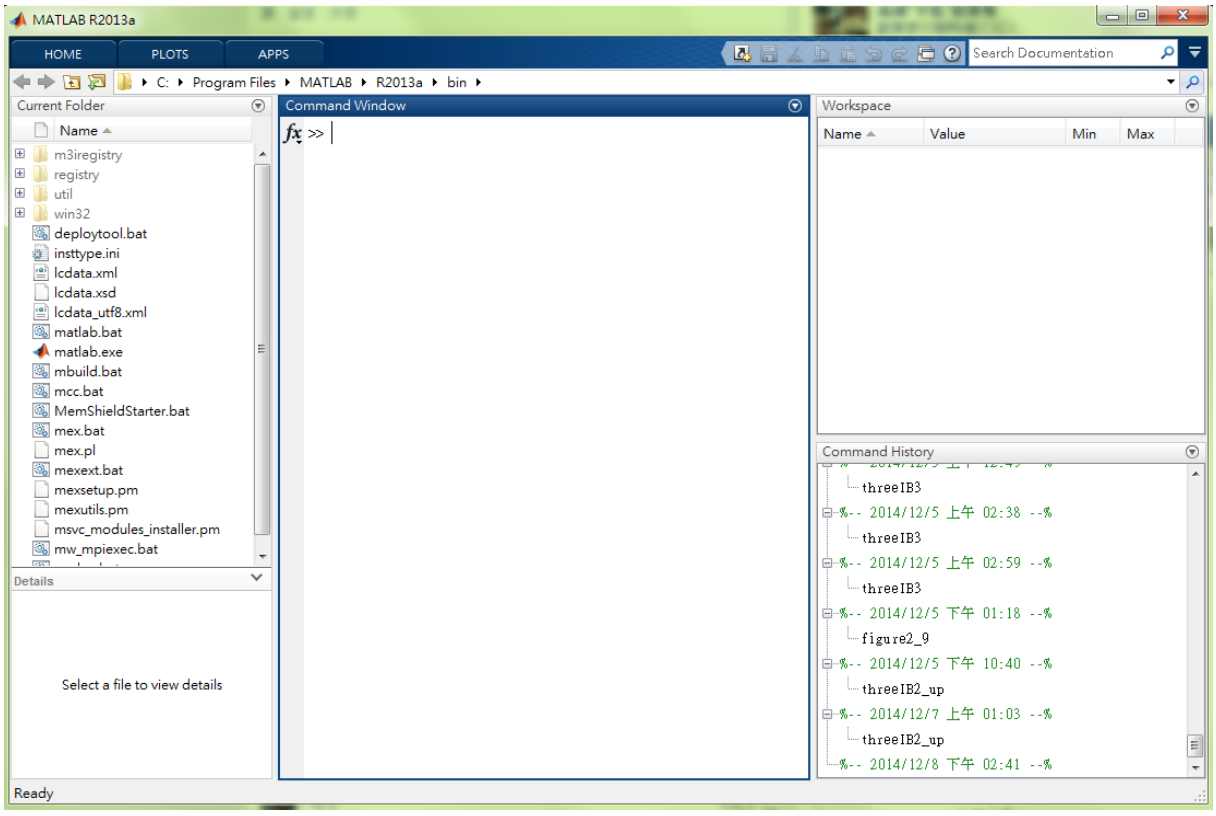
二、模擬軟體: AFORS-HET

AFORS-HET 是一套一維的元件模擬軟體，為德國 Helmholtz-Zentrum Berlin (HZB)研究所所開發的太陽能電池模擬軟體 AFORS-HET(Automat FOR Simulation of HETerostructures)，主要針對異質接面太陽能電池的數值模擬，可以模擬各種結構因素對太陽能電池性能的影響。



三、模擬軟體: MATLAB

MATLAB 是 MATrix LABoratory 的縮寫，是一款由美國 The MathWorks 公司出品的模擬數學軟體，透過 MATLAB 可以分析數據，開發演算法，並創建模型和應用。



活動剪影

2012 高雄應用科技大學光電與通訊工程研討會

研究成果

PATENTS:

1. U.S. patent, patent number: 8,471,471, K. -F. Chen, and J. G. Eden, “Tunneling Electron Controlled Microcavity Plasma Device and Arrays”, June 2013
2. U.S. patent, patent number: 7,477,017, J. G. Eden, K. -F. Chen, N.P. Ostrom, and S. J. Park, “AC-Excited Microcavity Discharge Device and Method”

JOURNAL PAPERS:

1. Ray-Hua Horng, Kuo-Feng Chen, Yao-Cheng Tsai, Cheng-You Suen, and Chao-Chih Chang, "Fabrication of a dual-planar-coil dynamic microphone by MEMS techniques," *Journal of Micromechanics and Microengineering*, v 20, n 6, p 065004 (7 pp.), June 2010【SCI, EI】

2. Ray-Hua Horng, Mu-Tao Chu, Hung-Ruei Chen, Wen-Yih Liao, Ming-Hsien Wu, Kuo-Feng Chen, and Dong-Sing Wuu, "Improved conversion efficiency of textured InGaN solar cells with interdigitated imbedded electrodes," *IEEE Electron Device Letters*, v 31, n 6, p 585-587, June 2010【SCI, EI】

3. K. -F. Chen, and J. G. Eden, "The plasma transistor: a microcavity plasma device coupled with a low voltage, controllable electron emitter", *Applied Physics Letters*, v 93, n 16, p 161501, 2008 【SCI, EI】

4. K. -F. Chen, N. P. Ostrom, S. -J. Park, and J. G. Eden, "One quarter million (500×500) pixel arrays of silicon microcavity plasma devices: Luminous efficacy above 6 lumens/watt with Ne/50% Xe mixtures and a green phosphor", *Applied Physics Letters*, v 88, n 6, p 061121, 2006 【SCI, EI】

5. S.-J. Park, K. -F. Chen, S.-H. Sung, C. J. Wagner, and J. G. Eden, "Implications of microcavity plasma devices for new plasma-display-panel cell structures with improved luminosity", *Journal of the Society for Information Display*, v 13, n 11, p 949-954, 2005 【SCI, EI】

6. J.G. Eden, S. -J. Park, N.P. Ostrom, K. -F. Chen, K.S. Kim, "Large Arrays of Microcavity Plasma Devices for Active Displays and Backlighting", *IEEE/OSA Journal of Display Technology*, v 1, n 1, p 112-116, 2005 【EI】

7. J.G. Eden, S. -J. Park, N.P. Ostrom and K. -F. Chen, "Recent advances in microcavity plasma devices and arrays: a versatile photonic platform", *Journal of Physics D: Applied Physics*, v 38, n 11, p1644-1648, 2005 【SCI, EI】

8. S.-J. Park, K. -F. Chen, N. P. Ostrom, and J. G. Eden, "40,000 pixel arrays of ac-excited silicon microcavity plasma devices", *Applied Physics Letters*, v 86, n 11, p 111501, 2005 【SCI, EI】

9. S. -J. Park, K. -F. Chen, N.P. Ostrom, and J.G. Eden, "Arrays of AC-excited silicon microdischarge devices as large as 40000 (200 x 200) pixels: electrical and optical characteristics for operation in neon", *Electronics Letters*, v 41, n 6, p 311-312, 2005 【SCI, EI】

CONFERENCE PAPERS: (7)

1. S.-J. Park, S.-H. Sung, K. -F. Chen, C. J. Wagner, and J. G. Eden," Microcavity plasma devices for display applications: Independently addressable arrays with improved luminous efficacy" *Digest of Technical Papers – SID 44th International Symposium*, v 37, p 1118-1121, June 2006

2. S.-H. Sung, P. A. Tchertchian, B. J. Ricconi, K. -F. Chen, S. -J. Park, J. G. Eden, "Efficient UV emission of addressable pixel arrays of Si microplasma devices", *Proceeding of IEEE 33rd International Conference on Plasma Science (ICOPS)*, p.410, June 2006

3. S.-J. Park, K. -F. Chen, S.-H. Sung, T.M. Spinka, and J.G. Eden, " Arrays of microcavity plasma devices: Concepts for future plasma displays*", IDW/AD'05 - Proceedings of the 12th International Display Workshops in Conjunction with Asia Display 2005*, n 2, p 1495-1498, Dec. 2005

4. S.-J. Park, K. -F. Chen, N. P. Ostrom, and J. G. Eden, "One Quarter Million Pixel Arrays of AC Excited Si Microplasma Devices", *Proceeding of IEEE 32nd International Conference on Plasma Science (ICOPS)*, p.318, June 2005

5. S.-J. Park, K. -F. Chen, and J. G. Eden, "Flexible microdischarge arrays: large scale fabrication and AC operation", *Lasers and Electro-Optics Society (LEOS)*. The 17th Annual Meeting of the IEEE, v 1, p 254-255*,* Nov. 2004

6. S.-J. Park, K. -F. Chen, and J. G. Eden, "Large scale arrays of microdischarge devices fabricated in Si", *Lasers and Electro-Optics Society (LEOS)*. The 17th Annual Meeting of the IEEE, v 1, p 256-257*,* Nov. 2004

7. K. -F. Chen, and W. Hsin, "Improved differential quantum efficiency for long-wavelength InGaAs/InGaAsP/InP SCH-SQW lasers with optimized multi-quantum barriers (MQB) design", *Lasers and Electro-Optics Society Annual Meeting (LEOS)*, v 1, p 288-289, Oct. 1995