Yueh-Heng Li (Assistant Professor)

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Professional Position:

2014-Now: Assistant Professor, Dept. Aero. & Astro., NCKU
2013-2014: Assistant Researcher, Research Center for Energy Technology and Strategy, NCKU
2011-2012: Postdoctoral Researcher, Research Center for Energy Technology and Strategy, NCKU
2008-2010: Postdoctoral Researcher, Dept. Aero. & Astro., NCKU

Honors and Awards:

2013: *Postdoctoral Scholar Research Award (National Science Council of Taiwan)* ***國科會博士後研究人員學術著作獎***
2010: *Outstanding Young Researcher Award (8th Asia-Pacific Conference on Combustion)****亞太燃燒研討會優秀青年學者***
2006, 2007: Best Student Paper Award, Combustion Institute ROC
2004: Grant Graduate Students Study Abroad Program (National Science Council of Taiwan)
2000: Outstanding Research Award, NSC College Student Research Project.

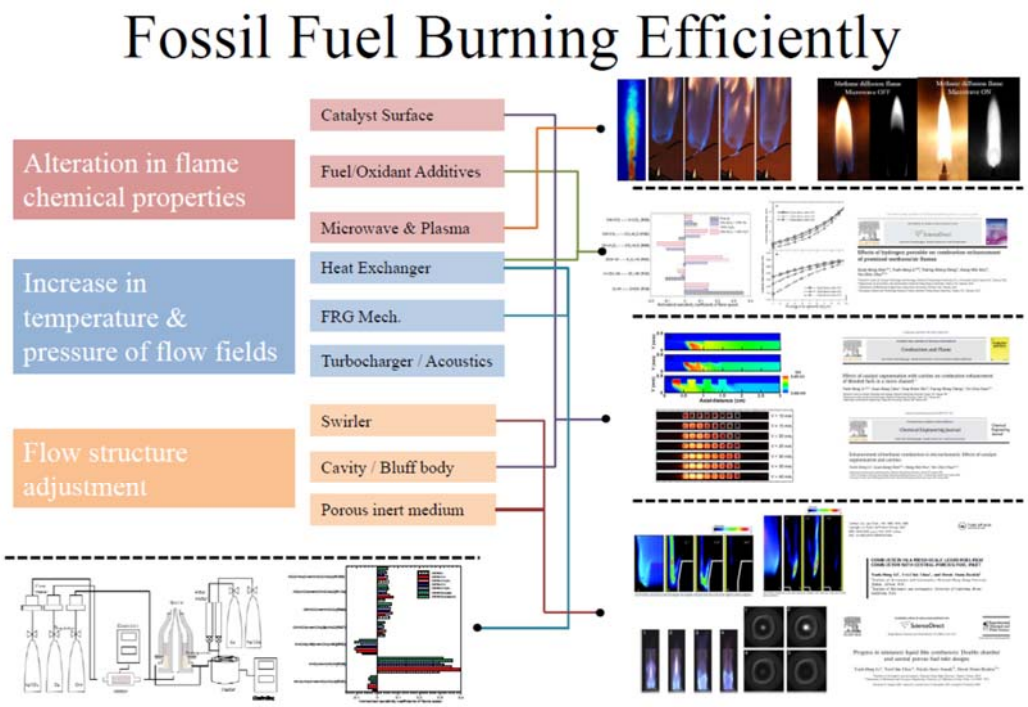
Scientific Expertise

Combustion and Heat transfer, Clean Fossil Fuel Combustion Technology, Thermophotovoltaics Power System Integration, Micro Plasma Thruster, Laser Diagnostics, Biomass Energy Technology, Numerical Analysis
燃燒與熱傳、潔淨化石燃燒技術、熱光電整合、微電漿推進器、雷射診測、生質能源科技、數值模擬

Current Research Activities:

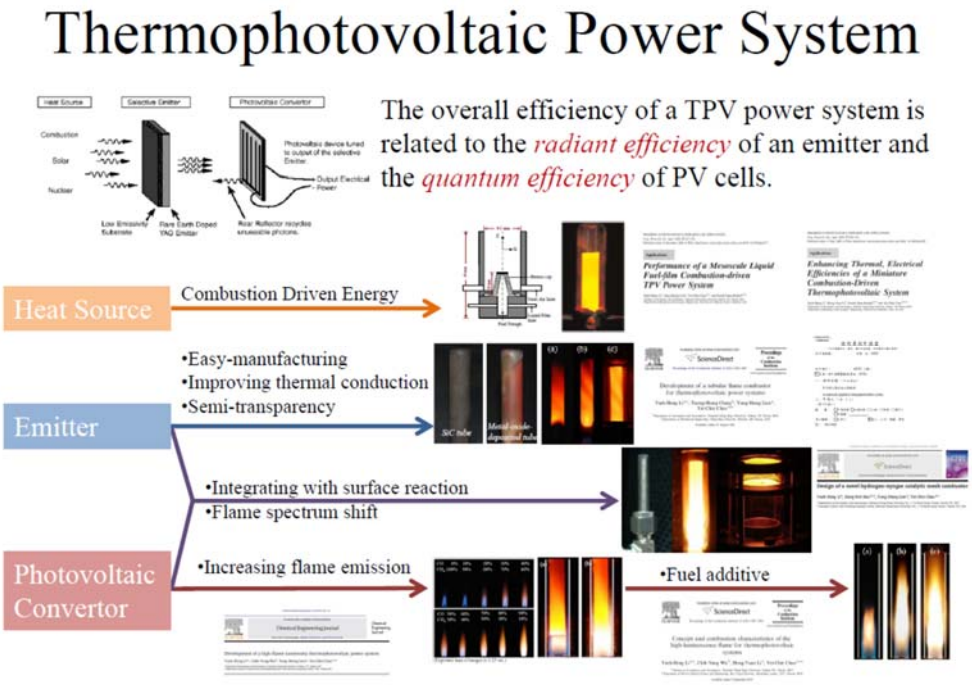
Dr. Yueh-Heng Li has been devoting himself to the development of promising green energy technology since he was a graduate student in National Cheng Kung University. Particularly, Dr. Li has been working on feasible and practical implements for improving flame behavior and combustion efficiency. In general, there are three approaches to enhance the fossil fuel combustion, alternation in flame chemical properties, increase in temperature and pressure of flow fields, and flow structure adjustment, respectively. Recently, Dr. Li doped hydrogen peroxide (H_2O_2) and nitrous oxide (N_2O) into premixed methane flames, and it turn out that the flame behavior and combustion efficiency had significant improvement. Besides, he also participated in oxy-coal combustion program, National Energy Project granted by Ministry of Science and Technology, Taiwan. He successfully designed a lab-scale 1KW coal-firing furnace, and conducted laser

diagnostic system (such as PIV and LII) to observe oxy-combustion behaviors. Besides, Dr. Li is interested in researches related to sub-lean flame stabilized by highly energetic intrusion. Dr. Li imposed a microwave-induced plasma to leash unstable sub-lean flames. The following flow chart is indicated that three primary concepts and the corresponding approaches proposed by Dr. Li utilized in combustion improvement of fossil fuels.



Besides, Dr. Li has been working on the development of meso-scale personal power system. He proposed and designed various small-scale reactors for burning gaseous and liquid fuels, and assembled with thermophotovotalic cells to further generate electricity output. Implanting a porous cap in a small-scale combustor can function as liquid fuel injector, and double as flame stabilizer. A reverse tube was used to redirect flus gas for heating up the combustion chamber. It resulted in the discovery of highly luminous and uniform emitting chamber which is suable for being an emitter in the micro-TPV power system. Many outstanding outcomes have published in renowned international journals. Accordingly, Dr. Li was invited to be the co-author in chapter 8 of monograph titled as "*Microscale Combustion and Power Generation*". Besides, Dr. Li also used a quartz tube coating metal-oxide layer and played as an emitter to replace silicon carbide. The advantage of metal-oxide-coating quartz tube has characteristics of easy-to-manufacturing and relatively high heat transfer compared to conventional SiC tube. Furthermore, Dr. Li added Iron carbonyl in liquid heptane in order to enhance flame emission and light intensity in visible wavelengths. This approach can compensate the low quantum efficiency of emitter in the visible wavelength section. A small-scale platinum tube with a novel mechanism is also implemented to the

small-scale TPV power system. The following flow chart is shown the important findings and outcomes on the development of a small-scale TPV power system.



Regarding the development of biomass technology, Dr. Li emphasized the development of bio-fuel application. In his opinion, the technology of bio-fuel production is sophisticated and almost commercialized. The biomass feedstock provision and bio-fuel application are two main challenges on the development of biomass energy technology. Dr. Li selected castor, miscanthus as well as rice straw as biomass feedstock based on its abundant resource in Taiwan. He performed a conventional pyrolysis to produce bio-fuels, such as bio-gas, bio-liquid and bio-char. Therefore, Dr. Li utilized bio-gas for self-retrofitted catalyst-combustion gas turbine and generated 1KW electricity output; bio-liquid-fuel for vehicle demonstration and chemical refinery, and bio-char for bio-fertilizer and co-firing with coal in industrial furnaces. The following flow chart is demonstrated the utilization and development of various bio-fuels.

Publications:

(* denotes the corresponding author)

Journal Paper: 27 (International, First author and corresponding author: 14), 3 (Domestic, Taiwan)

Ranking <5% : 14 (8) {Combustion and Flame, Proc. Combust. Inst.}

≤5% & 10%> : 4 (4) {Prog. Photovoltaics, Chem. Eng. J., Energy}

≤10% & 20%>: 3 (1) {Meas. Sci. Technol., Int. J. Hydrog. Energy}

≤ 20%　　: 6 (3) {Combust. Sci. Technol., Exp. Therm. Fluid Sci., Combust. Theory Model. }

Conference Paper: 50 (International), 35 (Domestic, Taiwan)

Dissertation/Monograph: 4

Patent: 3 (International), 4 (Domestics)

Journal Paper(國際期刊) **(* denotes the corresponding authors)**

1. **Yueh-Heng Li***, Guan-Bang Chen, Fang-Hsien Wu, Hsiu-Feng Hsieh, Yei-Chin Chao, "Effects of carbon dioxide in oxy-fuel atmosphere on catalytic combustion in a small-scale channel," ***Energy***, vol. 94, pp. 766-774, 2016. **(SCI, THERMODYNAMICS, 2014, Ranking:<4%)**
2. **Yueh-Heng Li***, Guan-Bang Chen, Yi-Chieh Lin, Yei-Chin Chao, "Effects of flue gas recirculation on the premixed oxy-methane flames in atmospheric condition," ***Energy***, vol. 89, pp. 845-857, 2015. **(SCI, THERMODYNAMICS, 2014, Ranking:<4%)**
3. Guan-Lin Chen, Guan-Bang Chen *, **Yueh-Heng Li****, Wen-Ting Wu, "A Study of Thermal Pyrolysis for Castor Meal using the Taguchi Method" ***Energy***, vol. 71, pp. 62-70, 2014. **(SCI, THERMODYNAMICS, 2012, Ranking:<4%)**
4. S. I. Yang*, T. C. Hsu1, C. Y. Wu, K. H. Chen, Y. L. Hsu and **Y. H. Li**, "Application of Biomass Fast Pyrolysis Part II: The Effects That Bio-Pyrolysis Oil Has on the Performance of Diesel Engines" ***Energy***, vol. 66, pp. 172-180, 2013. **(SCI, THERMODYNAMICS, 2014, Ranking:<4%)**
5. **Yueh-Heng Li***, Guan-Bang Chen, Tsarng-Sheng Cheng, Yean-Ling Yeh, Yei-Chin Chao, "Combustion characteristics of a small-scale combustor with a percolated platinum emitter tube for thermophotovoltaics," ***Energy***, vol. 61, pp. 150-157, 2013. **(SCI, THERMODYNAMICS, 2014, Ranking:<4%)**
6. Guan-Bang Chen*, **Yueh-Heng Li**, Tsarng-Sheng Cheng**, Yei-Chin Chao, "Chemical Effect of Hydrogen Peroxide Addition on Characteristics of Methane-Air Combustion," ***Energy***, vol. 55, pp. 564-570, 2013. **(SCI, THERMODYNAMICS, 2014, Ranking:<4%)**
7. **Yueh-Heng Li***, Guan-Bang Chen, Tsarng-Sheng Cheng, Yei-Chin Chao**, "Combustion Characteristics in a Small-Scale Reactor with Catalyst Segmentation and Cavities," ***Proceedings of the Combustion Institute***, vol. 34, pp. 2253-2259, 2013. **(SCI, ENGINEERING, MECHANICAL, 2011, Ranking:<4%)**
8. Chin-Yung Wu*, **Yueh-Heng Li**, Tzu-Wei Chang, "Effects of CO addition on the propagation characteristics of laminar CH_4 triple flame Combustion and Flame," ***Combustion and Flame***, vol. 159, pp. 2806-2816, 2012. **(SCI, MULTIDISCIPLINARY, 2011, Ranking:<1%, EI)**
9. **Yueh-Heng Li***, Guan-Bang Chen, Tsarng-Sheng Cheng, Yei-Chin Chao**, "Effect of

Catalyst Segmentation with Cavities on Combustion enhancement of Multi-Fuels in a Micro Channel," ***Combustion and Flame***, vol. 159, pp. 1644-1651, 2012. **(SCI, MULTIDISCIPLINARY, 2011, Ranking:<1%, EI)**

10. **Yueh-Heng Li***, Tsarng-Sheng Cheng, Yung-Sheng Lien, Yei-Chin Chao**, "Development of a Tubular-emitting Combustion-driven Thermophotovoltaic Power System," ***Proceedings of the Combustion Institute***, vol. 33, pp. 3439-3445, 2011. **(SCI, THERMODYNAMICS, 2011, Ranking:<4%)**
11. **Yueh-Heng Li***, Chih-Yung Wu, Hong-Yuan Li, Yei-Chin Chao**, "Concept and Combustion Characteristics of the High-luminescence flame for the Thermophotovoltaic Systems," ***Proceedings of the Combustion Institut****e*, vol. 33, pp. 3447-3454, 2011. **(SCI, THERMODYNAMICS, 2011, Ranking:<4%)**
12. Guan-Bang Chen*, **Yueh-Heng Li**, Tsarng-Sheng Cheng, Hung-Wei Hsu, Yei-Chin Chao**, "Effects of hydrogen peroxide on combustion enhancement of premixed methane/air flames," ***International Journal of Hydrogen Energy***, vol. 36, pp. 15414-15426, 2011. **(SCI, Energy and Fuel, 2011, Ranking:<15%, EI)**
13. Tsarng-Sheng Cheng*, Yei-Chin Chao, Guan-Bang Chen, **Yueh-Heng Li**, Chih-Yung Wu, "Experimental and numerical study on characteristyics of laminar premixed H_2/CO/CH_4/air flames," ***International Journal of Hydrogen Energy***, accepted, 2011. **(SCI, Energy and Fuel, 2011, Ranking:<15%, EI)**
14. **Yueh-Heng Li,** Guan-Bang Chen*, Hung-Wei Hsu, Yei-Chin Chao**, "Enhancement of Methane Combustion in Micro Channels: Effects of Catalyst Segmentation with Cavities," ***Chemical Engineering Journal***, vol. 160, pp. 715-722, 2010. **(SCI, ENGINEERING, CHEMICAL, 2011, Ranking:<9%, EI)**
15. **Yueh-Heng Li***, Chih-Yung Wu, Yung-Sheng Lien, Yei-Chin Chao**, "Development of a High-Flame-Luminosity Thermophotovoltaic Power System," ***Chemical Engineering Journal***, vol. 162, pp. 307-313, 2010. **(SCI, ENGINEERING, CHEMICAL, 2011, Ranking:<9%, EI)**
16. **Yueh-Heng Li,** Yung-Sheng Lien, Yei-Chin Chao*, Derek Dunn-Rankin**, "Performance of a mesoscale liquid fuel-film combustion driven TPV power system," ***Progress in Photovoltaics: Research and Applications***, vol. 17, pp. 327-336, 2009. **(SCI, Energy and Fuel, 2011, Ranking:<7%, EI)**
17. **Yueh-Heng Li,** Hong-Yuan Li, Yei-Chin Chao*, Derek Dunn-Rankin**, "Enhancing thermal, electrical efficiencies of a miniature combustion-driven TPV system," ***Progress in***

Photovoltaics: Research and Applications, vol. 17, pp. 502-512, 2009. **(SCI, Energy and Fuel, 2011, Ranking:<7%, EI)**

18. **Yueh-Heng Li,** Hung-Wei Hsu*, Yung-Sheng Lien, Yei-Chin Chao**, "Design of a novel hydrogen-syngas catalytic mesh combustor," ***International Journal of Hydrogen Energy***, vol. 34, pp. 8322-8328, 2009. **(SCI, Energy and Fuel, 2011, Ranking:<15%, EI)**
19. **Yueh-Heng Li**, Yei-Chin Chao, Nicola Sarzi Amadé, Derek Dunn-Rankin*, "Progress in miniature liquid film combustors: Double chamber and central porous fuel inlet designs," ***Experimental Thermal and Fluid Scienc*e**, vol. 32, pp. 1118-1131, 2008. **(SCI, Engineering Mechanical, 2011, Ranking=26/121, EI)**
20. **Yueh-Heng Li**, Chin-Yung Wu, Bi-Chian Chen, Yei-Chin Chao*, "Measurements of a high-luminosity flame structure by a shuttered PIV system," ***Measurement Science and Technology***, vol. 19, 045401, 2008. **(SCI, Engineering Multidisciplinary, 2007, Ranking=15/90, EI)**
21. **Yueh-Heng Li**, Derek Dunn-Rankin*, Yei-Chin Chao**, "Combustion in a meso-scale liquid-fuel-film combustor with central-porous fuel inlet," ***Combustion Science and Technology***, vol. 180, pp. 1900-1919, 2008. **(SCI, Engineering Multidisciplinary, 2011, Ranking= 38/90, EI)**
22. Tsarng-Sheng Cheng*, Chih-Peng Chen, Chin-Sheng Chen, **Yueh-Heng Li**, Chih-Yung Wu, Yei-Chin Chao, "Characteristics of microjet methane diffusion flame," ***Combustion Theory and Modeling***, vol. 10, Issue: 5, pp. 861-881, 2006. (**SCI, Thermodynamics, 2011, Ranking=23/52, EI)**
23. Tsarng-Sheng Cheng, Chih-Yung Wu, **Yueh-Heng Li**, Yei-Chin Chao*, "Chemiluminescence measurements of local equivalence ratio in a partially premixed flame," ***Combustion Science and Technology***, vol. 178, pp. 1821-1841, 2006. **(SCI, Engineering Multidisciplinary, 2011, Ranking= 38/90, EI)**
24. Tsarng-Sheng Cheng*, Chih-Yung Wu, Chih-Peng Chen, **Yueh-Heng Li**, Yei-Chin Chao, Tony Yuan, and Tzong-Shyng Leu, "Detailed measurement and assessment of laminar hydrogen jet diffusion flames," ***Combustion and Flame***, vol. 146, Issue: 3, pp. 481-494, 2006. **(SCI, MULTIDISCIPLINARY, 2011, Ranking:<1%, EI)**
25. Chih-Yung Wu, Yei-Chin Chao*, Tsarng-Sheng Cheng, **Yueh-Heng Li**, Kuo-Yuan Lee, and Tony Yuan, "The Blowout Mechanism of Turbulent Jet Diffusion Flames," ***Combustion and Flame***, vol. 145, Issue: 1-2, pp. 268-282, 2006. (NSC-91-2212-E-006- 053) **(SCI, MULTIDISCIPLINARY, 2011, Ranking:<1%, EI)**

26. Yei-Chin Chao*, Chih-Yung Wu, Kuo-Yuan Lee, **Yueh-Heng Li**, Ruey-Hung Chen, and Tsarng-Sheng Cheng, "Effects of Dilution on Blowout Limits of Turbulent Jet Flames," ***Combustion Science and Technology***, vol. 176, pp. 1735-1753, 2004. **(SCI, Engineering Multidisciplinary, 2011, Ranking= 38/90, EI)**
27. Tsarng-Sheng Cheng*, Yei-Chin Chao, Chih-Yung Wu, **Yueh-Heng Li**, Yuji Nakamura, Kuo-Yuan Lee, and Tony Yuan, "Experimental and Numerical Investigation of Microscale Hydrogen Diffusion Flames," ***Proceeding of the Combustion Institute***, vol. 30, pp. 2489-2497, 2005. **(SCI, THERMODYNAMICS, 2011, Ranking:<4%)**

Dissertation/Monograph

1. **Yueh-Heng Li**, 2002, "A Study of Mutual Interaction of a Jet Flame and Horizontal Wall," Thesis of Master degree in Institute of Aeronautics and Astronautics, National Cheng Kung University.
2. **Yueh-Heng Li**, 2008, "Development of a Meso-scale Fuel-Film Combustor with Central-Porous Fuel Inlet," Dissertation for Doctor Philosophy in Institute of Aeronautics and Astronautics, National Cheng Kung University.
3. **Yueh-Heng Li**, Yei-Chin Chao, 2009, "Development of a Meso-scale Central-Porous-Fuel-Inlet Combustor," Monograph, VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG, ISBN 978-3-639-10875-0.
4. Derek Dunn-Rankin, William Sirignano, Yei-Chin Chao, **Yueh-Heng Li**, "Chapter 8 Liquid fuel combustion" in *Microscale Combustion and Power Generation*, Y. Ju, K. Maruta, C. Cadou, ed., Momentum Press, LLC, New Jersey, USA. ISBN-13: 978-1-60650-306-5.