汪 上 曉 教授
DAVID SHAN-HILL WONG, PROFESSOR

- 美國加州理工學院　學士，民國六十七年
- 美國德拉威大學　　碩士，民國七十年
- 美國德拉威大學　　博士，民國七十一年

- B.S. California Institute of Technology, USA, 1978
- M.S. University of Delaware, USA, 1981
- Ph.D. University of Delaware, USA, 1982

主要研究領域

今日化學製程系統工程師之主要工作除了針對傳統化學製程改善產品品質、提高能源效率及減低環境衝擊，還需要開發各類新興產業如半導體、光電、生物科技之製程。對傳統化學製程而言，我們已習慣使用以質能守恆結算、輸送現象、熱力學及動力學為基礎之理論模式進行模擬，探討製程之最適化及控制；隨大數據時代的來臨及人工智慧計算的發展，我們可以利用機器學習的方法，進行製程及產品之改善及開發。本實驗室之研究重點為利用數據驅動的機器學習方法結合物理、化學及生物知識發展系統模式，開發高效製程及優質產品之用；目前的幾個主題為：利用深度學習建立製程數位學生模型進行優化控制、及分子結構−性質預測、流動化學系統的流體力學模擬、以及快速失控系統的監控預警等。

Main Research Interests

Today, in addition to making the traditional chemical process more energy efficient and environmentally benign, chemical process system engineers are also facing challenges in design and development of novel products and processes in various newly developed industries such as semi-conductor manufacturing, opto-electronic materials, biotechnology. Availability of big data and advancement in artificial intelligence opens up new possibilities of using data-driven machine-learned models for processes and products development. Our laboratory focuses on the integration of data driven machine learning and knowledge driven physical modelling to develop models for processes and products development, Current topics include the use of deep learning for development of digital twins of actual chemical plants for optimization control, as well as structure-property predictions for molecules design. using deep-learning, simulation, design and control of advanced separation process, computation fluid dynamics simulations for flow chemistry, monitoring and warning of systems with catastrophic failure etc.

代表作 (Selected Publications)

- Chang JJ, **Wong DSH***, Huang CH, Kang JL, Hsu HH and Lin ST (2021). Towards a universal digital chemical space for pure component properties prediction. *Fluid Phase Equilibria*, 527(1), 112829-112838.

- Chiang HL, Chen YS, Sun YA, **Wong DSH** and Tsai DH* (2020). Aerosol Spray Controlled Synthesis of Nanocatalyst using Differential Mobility Analysis coupled to Fourier-Transform Infrared Spectroscopy. *Industrial & Engineering Chemistry Research*, 59(24)，11187-11195.

- Chou CH, Wu HB, Kang JL*, **Wong DSH**, Yao Y, Chuang YC, Jang SS and Ou JDY (2020). Physically Consistent Soft-Sensor Development Using Sequence-to-Sequence Neural Networks. *IEEE Transactions on Industrial Informatics*, 16(4), 2829-2838.

- Nguyen HLQ, **Wong DSH*** (2019). Eliminating Steam Requirement of Aqueous Ammonia Capture Process by Lean Solution Flash and Vapor Recompression, *Process Integration and Optimization for Sustainability*, 3(3), 307319.

- Wang SJ*, **Wong DSH***, Lim IJQ, Chen YT and Huang CC (2018). Design and Control of a Novel Plant-Wide process for Epichlorohydrin Synthesis by Reacting Allyl Chloride with Hydrogen Peroxide, *Industrial Research & Engineering Chemistry*, 57(20), 69266936.