



陳 信 龍 教授 HSIN-LUNG CHEN, PROFESSOR

- 美國麻州大學 碩士，民國七十九年
- 美國麻州大學 博士，民國八十三年
- M.S. University of Massachusetts/Amherst, 1990
- Ph.D. University of Massachusetts/Amherst, 1994

主要研究領域

本實驗室目前研究主題包括：

■ DNA錯合物之自組裝結構

DNA與樹枝體(dendrimers)形成的錯合物是相當受重視的非病毒型基因載體，該錯合物亦可做為生物體染色質的模型系統。我們利用小角度中子與X-光散射研究深入解析DNA與dendrimers錯合物的階層性結構及該結構之操控，並進一步探討該錯合物結構與染色質結構之異同，解析控制染色質結構形成的重要因子。

■ 嵌段共聚物之自組裝與結晶行為

利用嵌段共聚物作為奈米模版，探討高分子鏈在不同幾何空間拘限之結晶行為，另外我們亦深入研究嵌段共聚物的非典型奈米結構與特殊的熱力學狀態，為這種奈米材料性質操控建立重要基礎。

■ 共軛高分子之構形與超分子結構

共軛發光高分子是一種應用在發光二極體、太陽能電池及場效電晶體的高分子半導體材料。我們利用小角度中子與X-光散射研究此類型高分子在溶液態之分子鏈構形與聚集狀態，建立發光高分子膜形態形成之機制與控制方法，進而可精準調節高分子膜之光物理性質。

■ 高分子奈米複合材料之階層性結構

利用小角度X-光散射解析高分子與奈米粒子形成的奈米複合材料之多尺度結構，完整建立該材料結構與性質相關性。

Main Research Interests

Current research in my group is focused on the following areas:

■ Self-assembly of the Electrostatic Complexes of DNA

Gene therapy is a promising new therapeutical modality. While the complex of dendrimer with DNA is considered as a useful gene delivery systems, the supramolecular structure formation of the dendriplexes is still not well understood. We have been studying the self-assembled structures of DNA complexed with PAMAM dendrimers with a broad range of generation using SAXS and SANS. We are also interested in resolving the similarity between the beads-on-string structure of the dendriplex and that of chromatin to identify the controlling factor of chromatin structure formation.

■ Templated Crystallization and Self-assembly of Block Copolymers

We have been studying the crystallization behavior of chain molecules confined in a variety of microdomain and vesicle geometries using block copolymers as nanoscale templates. The effect of spatial confinement on the nucleation mechanism and crystal orientation is of particular interests. We have also been exploring the unconventional nanostructures formed by block copolymers with current emphasis on the ordered bicontinuous double diamond (OBDD) structure formed by a stereoregular diblock copolymer. Moreover, we have also discovered an anomalous thermodynamic state of the weakly-interacting diblock copolymer, which is under intensive study using scattering techniques.

■ Conformational and Supramolecular Structures of Conjugated Polymers

We have been exploring the conformational structures of model conjugated polymers using small angle neutron and X-ray scatterings. Our aim is to establish the correlation between solution structure and film morphology. This basic information is of great importance for tuning/controlling the photophysical properties of the conjugated polymer thin films.

■ Hierarchical structure of Polymer Nanohybrids

代表作 (Selected Publications)

- Lin, Y.-C.; **Chen, H.-L.***; Hashimoto, T.; Chen, S.-A. Mechanism of Hierarchical Structure Formation of Polymer/Nanoparticle Hybrids. *Macromolecules* **2016**, 49, 7535.
- Huang, Y.-C.; Su, C.-J.; Chen, C.-Y.; **Chen, H.-L.***; Jeng, U. S.; Berezhnoy, N. V.; Nordenskiöld, L.; Ivanov, V. A. Elucidating the DNA-Histone Interaction in Nucleosome from the DNA-Dendrimer Complex. *Macromolecules* **2016**, 49, 4277.
- Liu, C.L., Lin, M.C.; **Chen, H.L.***; Muller, A.J. Evolution of Crystal Orientation in One-Dimensionally Confined Space Templated by Lamellae-Forming Block Copolymers. *Macromolecules* **2015**, 48, 4451.
- Yang, C. C.; Huang, Y. C.; Chen, C. Y.; Su, C. J.; **Chen, H. L.***; Ivanov, V. A., Structure of the Electrostatic Complex of DNA with Cationic Dendrimer of Intermediate Generation: The Role of Counterion Entropy *Macromolecules* **2014** 47, 3117.
- P.Y. Chen; A. Rassamesard; **H.L. Chen***; S.A. Chen, Conformation and Fluorescence Property of Poly(3-hexylthiophene) Isolated Chains Studied by Single Molecule Spectroscopy: Effects of Solvent Quality and Regioregularity *Macromolecules* **2013**, 46, 5657.