超分子聚合物：從自組裝到功能性材料

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超分子聚合物能夠對環境變化做出快速反應，從而在聚合物內產生易於控制的非共價相互作用力。因此，透過非共價相互作用力來形成聚合物或聚合物網絡是創建刺激響應軟質材料的一種有吸引力的方法。最近，科學界對超分子聚合物表現出極大的興趣，因為它們在自修復薄膜、奈米複合材料、有機元件和組織工程等領域具有廣泛的應用性。本次演講旨在概述我們目前在超分子聚合物的開發及其物理表徵的研究。此外，我們將展示超分子聚合物的範例，介紹它們在不同面相的應用，並討論基於多重氫鍵的分子識別與聚合物科學相互結合的最新進展。

Supramolecular Polymers: From Self-assembly to Functional Materials

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Supramolecular polymers enable a swift response to environmental changes, resulting in easily controllable noncovalent interactions within the polymer. Consequently, the formation of polymers or polymer networks through noncovalent interactions is an appealing method for creating stimuli-responsive soft materials. Recently, the scientific community has shown significant interest in supramolecular polymers due to their diverse applications in fields such as self-healing membranes, nanocomposites, organic devices, and tissue engineering. This presentation aims to provide an overview of our ongoing research in the development and physical characterization of supramolecular polymers. In addition, we will showcase examples of supramolecular polymers, highlighting their varying applications and discussing recent advancements in combining multiple hydrogen bonding-based molecular recognition with polymer science.

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Research Interests:

Functional polymers, Polymer nanocomposites, Supramolecular polymers for health-related applications.

Representative Publications:

(1) Yohannes Asmare Fesseha, Abere Habtamu Manayia, Ping-Cheng Liu, Ting-Hsuan Su, Sin-Yu Huang, Chih-Wei Chiu, **Chih-Chia Cheng***, "Photoreactive Silver-Containing Supramolecular Polymers that Form Self-Assembled Nanogels for Efficient Antibacterial Treatment" *Journal of Colloid and Interface Science*, **2024**, 654, 967-978.

(2) Vo Thuy Thien Ngan, Fasih Bintang Ilhami, Sin-Yu Huang, Ting-Hsuan Su, Hsin-Hsuan Tsai, **Chih-Chia Cheng***, "CO_2-Responsive Drug Delivery System Created by Supramolecular Design and Assembly for Safer, More Effective Cancer Therapy" *Materials Today Advances*, **2023**, 19, 100400.

(3) Yi-Hsuan Chang, Wei-Hung Chiang, Fasih Bintang Ilhami, Cheng-Yu Tsai, Sin-Yu Huang, **Chih-Chia Cheng***, "Water-Soluble Graphene Quantum Dot-based Polymer Nanoparticles with Internal Donor/Acceptor Heterojunctions for Efficient and Selective Detection of Cancer cells" *Journal of Colloid and Interface Science*, **2023**, 637, 389-398.

(4) Abere Habtamu Manayia, Fasih Bintang Ilhami, Sin-Yu Huang, Ting-Hsuan Su, Cheng-Wei Huang, Chih-Wei Chiu, Duu-Jong Lee, Juin-Yih Lai, **Chih-Chia Cheng***, "Photoreactive Mercury-Containing Metallosupramolecular Nanoparticles with Tailorable Properties That Promote Enhanced Cellular Uptake for Effective Cancer Chemotherapy" *Biomacromolecules*, **2023**, 24, 943–956.

(5) Fasih Bintang Ilhami, Sin-YuHuang, **Chih-Chia Cheng***, "Multi-Biofunctional Silver-Containing Metallosupramolecular Nanogels for Efficient Antibacterial Treatment and Selective Anticancer Therapy" *Acta Biomaterialia*, **2022**, 151, 576-587.

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(7) Cheng-You Wu, Ashenafi Zeleke Melaku, Wei-Tsung Chuang, **Chih-Chia Cheng***, "Manipulating the Self-Assembly Behavior of Graphene Nanosheets via Adenine-Functionalized Biodegradable Polymers" *Applied Surface Science*, **2022**, 572, 151437.