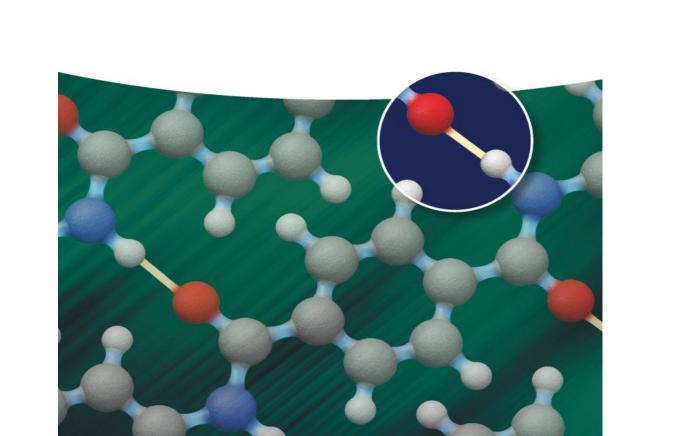
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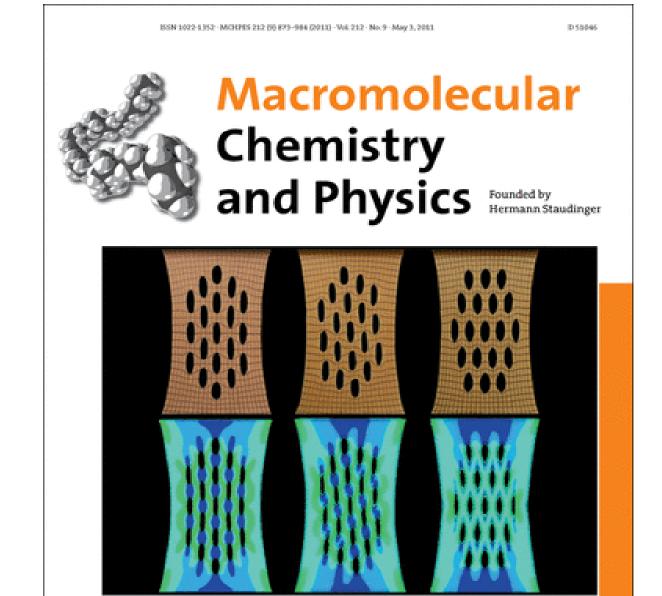
研究成果發表



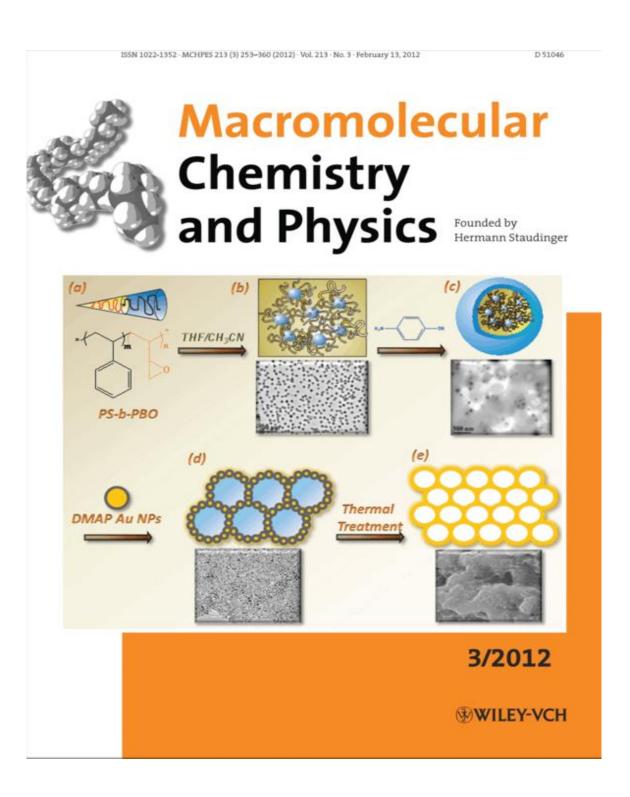
Hydrogen Bonding

in Polymeric Materials

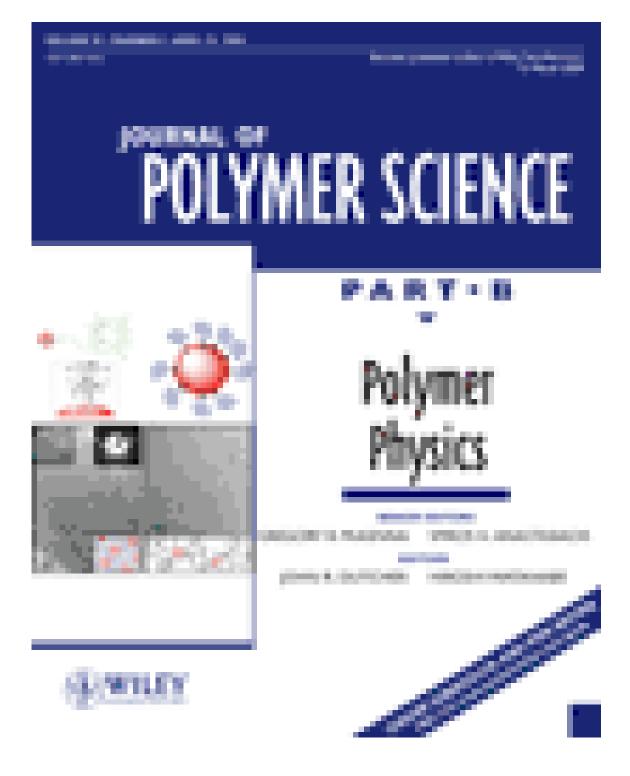


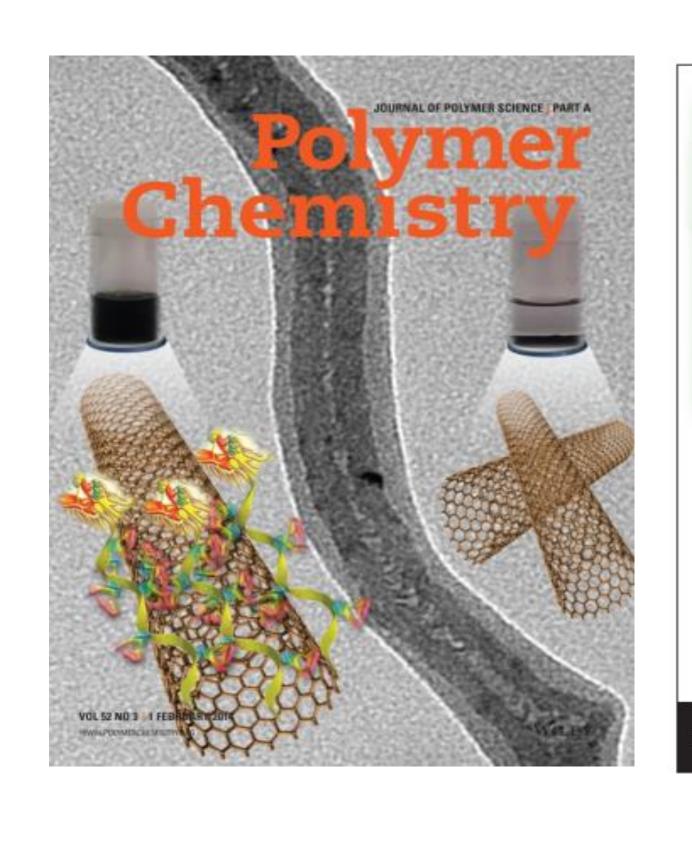


WILEY-VCH









Separated Coil and Chain Aggregation Behaviors on the Miscibility

Department of Materials and Optoelectronic Science, Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University,

utions, thereby controlling the miscibility behavior and ondary structures of the PTvr. Infrared spectroscopy

oyridyl groups of P4VP. Differential scanning calorimetry revealed that the glass transition temperatures of the PTyr/P4VP complexes formed from MeOH solutions were higher than those of the corresponding PTyr/P4VP miscible blends obtained from DMF solutions. The behavior of the PTyr/P4VP blends obtained after evaporation of the DMF solutions was consistent

hydrogen bounding of Fryn With Fry Testited in β -since conformation (Fryn Spectroscopy, solid state nuclear magnetic resonance spectroscopy, and wide-angle X-ray diffraction analyses. This model, which takes advantage of the well-defined secondary structures (α -helices, β -sheets) of PTyr, can, therefore, be used to identity the

Amino acid-based polymers, including polypeptides, have been emerged as important features in the development of several

as poly(ethylene glycol) (PEG), is used typically for the development of new materials. $^{3-5}$ In addition, multiblock copolymers have also been prepared to model silk-based L-glutamate) (PBLG), poly(r-ethyl ι -glutamate) (PBLG), and poly(r-benzyl ι -glutamate) (PBLG) could be altered through blending with

materials, which formed nanostructures through β -sheet self-other random-coil nonpeptide oligomers [namely, phenolic

ssembly. Most poly(peptide-b-nonpeptide) (rod/coil) block resin or poly(vinylphenol) (PVPh)], mediated by hydrogen

h separated random coils of the PTyr chains. The increased degree of hydrogen bonding within the PT

neurodegenerative disorders (e.g., prion diseases). 29 As a resul

conformational studies of model polypeptides are important

and Helical Peptide Secondary Structure of Poly(tyrosine) with

Poly(4-vinylpyridine)

Yi-Syuan Lu, Yung-Chih Lin, and Shiao-Wei Kuo*

weight polytyrosine (PTyr) through living ring-opening polymerization of the α -amino acid-N-carboxyanhydride and hen blended it with poly(4-vinylpyridine) (P4VP) homopol-

tudied widely because of their potential applications as

storage†

Ahmed F. M. EL-Mahdy, ab Cheng-Han Kuo, Abdulmohsen Alshehri, C

Christine Young, d Yusuke Yamauchi, left Jeonghun Kim left and Shiao-Wei Kuo left and Shiao

Hexagonally ordered covalent organic frameworks (COFs) are interesting new crystalline porous materials

that have massive potential for application in gas storage. Herein, we report the synthesis of two series

of two-dimensional hexagonally ordered COFs—TPA-COFs and TPT-COFs—through one-pot

3NH₂), respectively, with triarylaldehydes featuring different degrees of planarity, symmetry, and nitrogen

content. All the synthesized COFs exhibited high crystallinity, large BET surface areas (up to 1747 m² g⁻¹)

excellent thermal stability, and pore size distributions from 1.80 to 2.55 nm. The symmetry and planarity

of the monomers strongly affected the degrees of crystallinity and the BET surface areas of the resultant

COEs. In addition, these COEs displayed excellent CO₂ uptake efficiencies of up to 65.65 and 92.38 mg

q⁻¹ at 298 and 273 K, respectively. The incorporation of the more planar and higher-nitrogen-content

triaryltriazine unit into the backbones of the TPA-COFs and TPT-COFs enhanced the interactions with

CO₂, leading to higher CO₂ uptakes. Moreover, the synthesized COFs exhibited electrochemical

properties because of their conjugated structures containing redox-active triphenylamine groups. This

study exposes the importance of considering the symmetry and planarity of the monomers when

designing highly crystalline COFs; indeed, the structures of COFs can be tailored to vary their

covalently bonded frameworks are porous organic materials that the construction of highly crystalline organic frameworks

have light weight, highly crystalline, and highly porous; most remains a challenge. Reported methods for the construction of

and modified using organic synthesis to ensure desired func- through a reversible condensation strategy using, for example,

tions. Thus, they have garnered great attention for their diverse boronic ester formation, ^{27,28} Schiff base (imine) condensation

*Department of Materials and Optoelectronic Science, National Sun Yat-Sen University, Kaohsiung 80424, Taiwan. E-mail: kuosw@faculty.nsysu.edu.tw approaches, imine condensation has been particularly widely

bChemistry Department, Faculty of Science, Assiut University, Assiut 71516, Egypt used for the synthesis of various COFs having a range of crys-

ternational Centre for Materials Nanoarchitectonics (MANA), National Institute for aldehyde and amino functional groups. 35,36

Materials Science (NIMS), 1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan

19532 | J. Mater. Chem. A, 2018, 6, 19532-19541

Department of Chemistry, King Abdulaziz University, P.O. Box. 80203, Jeddah 21589, tallinities and porosities, mainly because of the high stability of

Comparison of Comparison of Copy is that their structures can be controlled by varying their organic monomers. The University of Queensland, Brisbane, QLD 4072, ustralia. E-mail: jeonghun.kim@uq.edu.au

One of the greatest attractions of COFs is that their structures can be controlled by varying their organic monomers. The University of Queensland, Brisbane, QLD 4072, ustralia. E-mail: jeonghun.kim@uq.edu.au

Nevertheless, controlling the crystallinity and porosity of a COF

Department of Plant & Environmental New Resources, Kyung Hee University, 1732 remains challenging. 19 Previous reports have suggested that the

eogyeong-daero, Giheung-gu, Yongin-si, Gyeonggi-do 446-701, South Korea porosity and crystallinity of COFs can be enhanced through the

ectronic supplementary information (ESI) available: Details of synthetic use of three methods. First, the crystallinity of COFs has been

application in gas storage and separation,4-7 chemical

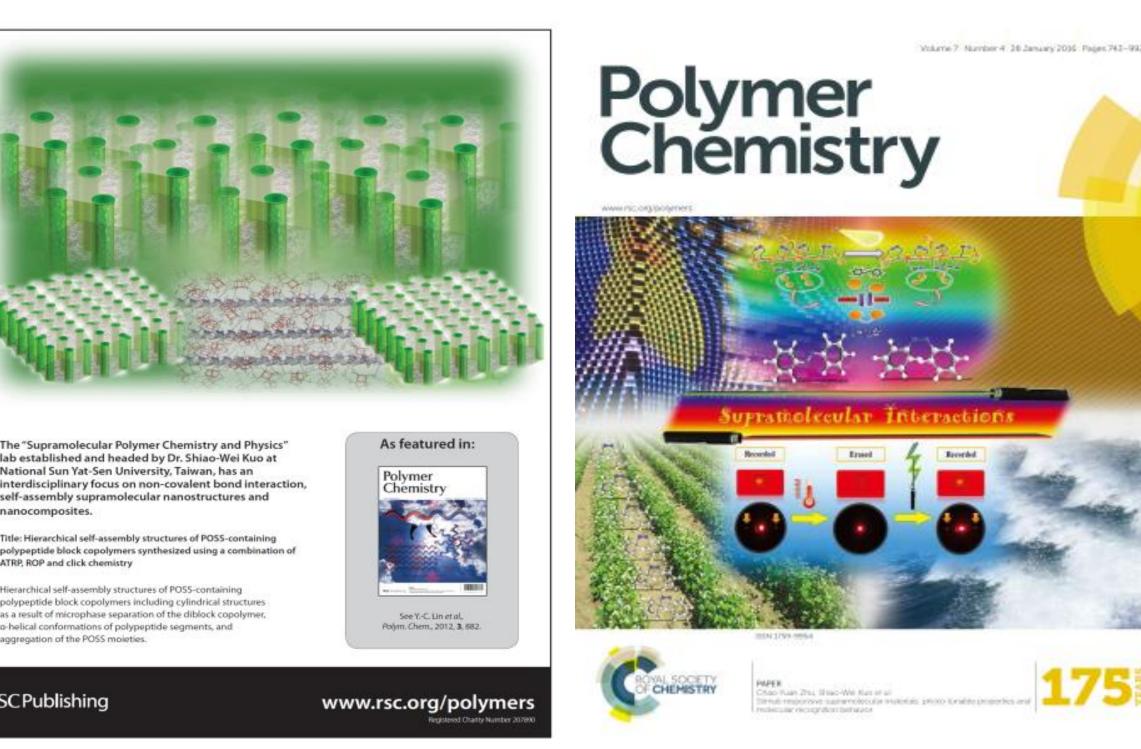
of aromatic amines and aromatic aldehydes, 29-31 triazine poly-

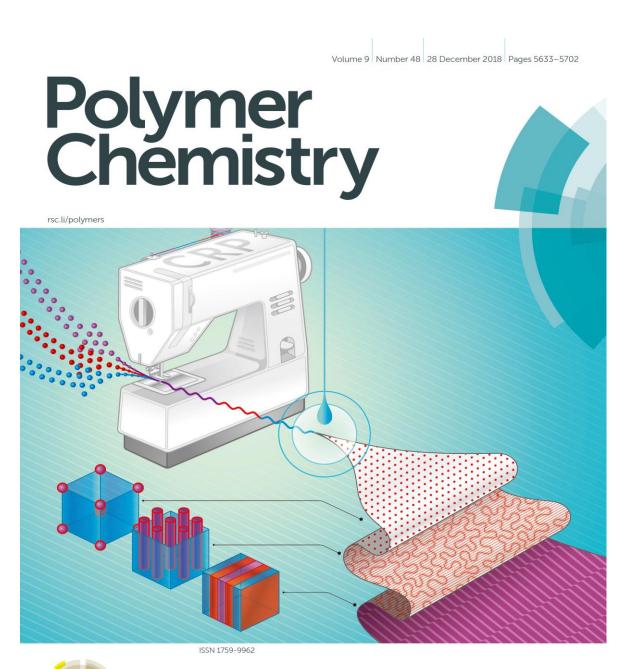
imino bonds and the wide availability of monomers containing

polycondensations of tris(4-aminophenyl)amine (TPA-3NH₂) and 2,4,6-tris(4-aminophenyl)triazine (TPA-3NH₂)

condary structures of the PTyr. Infrared spectroscopy

behavior of separated coils and aggregated chains in polymer blend and complex systems.







Trilayered Single Crystals with Epitaxial Growth in Poly(ethylene

oxide)-block-poly(ε -caprolactone)-block-poly(ι -lactide) Thin Films

D are earth (RE) ions doped upconversion nanoparticles emission line, large anti-Stokes shifts, long luminescence

(UCNPs) have attracted great attention over the past lifetimes, deep penetration in tissue, biocompatibility, low

decade due to their unique upconversion luminescence (UCL) toxicity, and water solubility. 1-3 Various types of highly efficient

energy through a multiphoton absorption process. $^{1-3}$ UCNPs are particularly suitable to be used as photonic biomarkers in (F^{3+}) , thulium (F^{3+}) , or holmium (F^{3+}) .

bioimaging and biosensing applications 4-6 because they do not to now, UCL quantum yields of RE ions doped UCNPs ar

that most traditional fluorophores encounter. In addition,

ACS Publications © 2018 American Chemical Society 3263

UCNPs can provide advantages such as good photostability, Received: April 16, 2018

low scattering, no blinking, high signal-to-noise ratio, sharp

Published: May 14, 2018

have the problems like photobleaching and autofluorescence rather low, 10 especially in aqueous solution, which limits them

DOI: 10.1021/acsphotonics.8b00494 ACS Photonics 2018, 5, 3263–3271

and emit ultraviolet—visible luminescence with higher photon sodium yttrium fluoride (NaYF₄) host codoped with ytterbi

properties. UCNPs can be excited by near-infrared (NIR) light UCNPs have been developed; with a typical one comprises



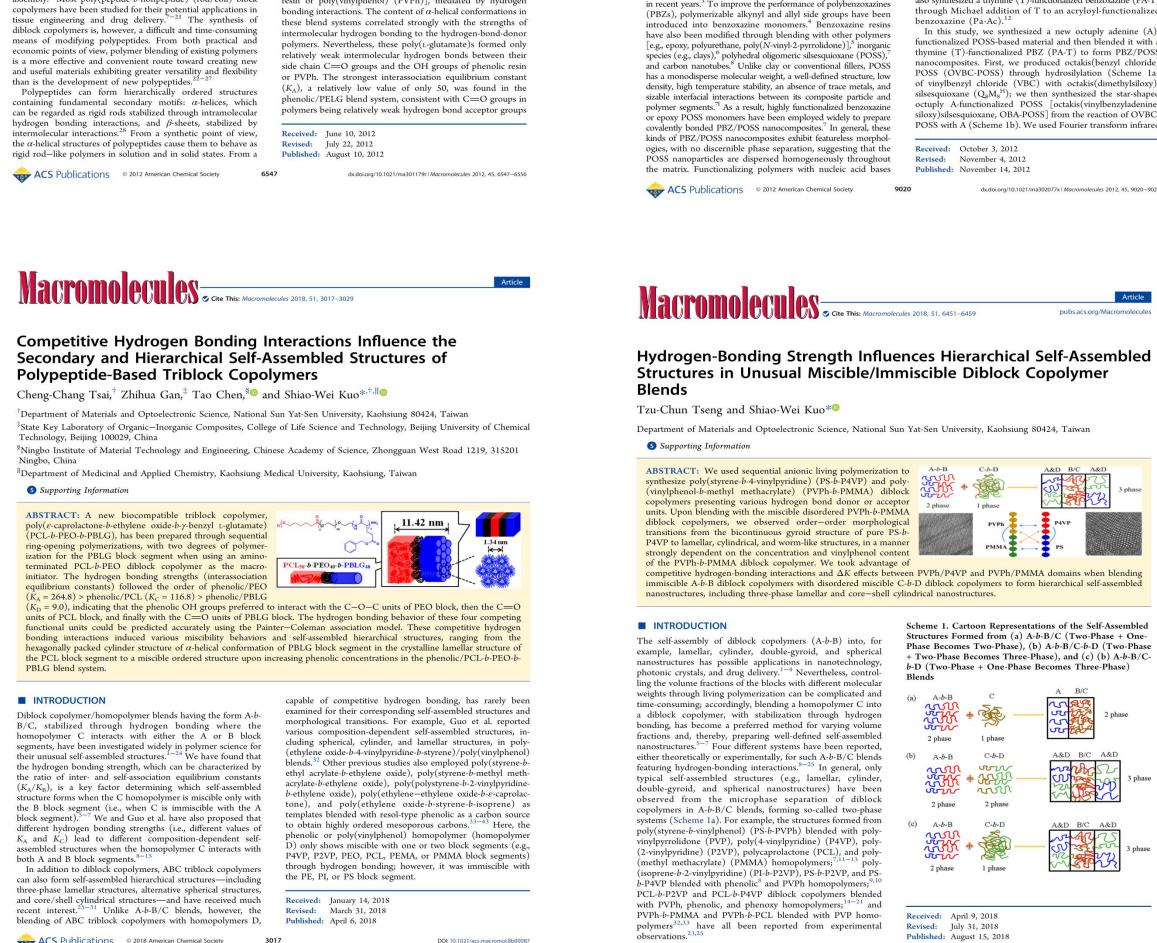


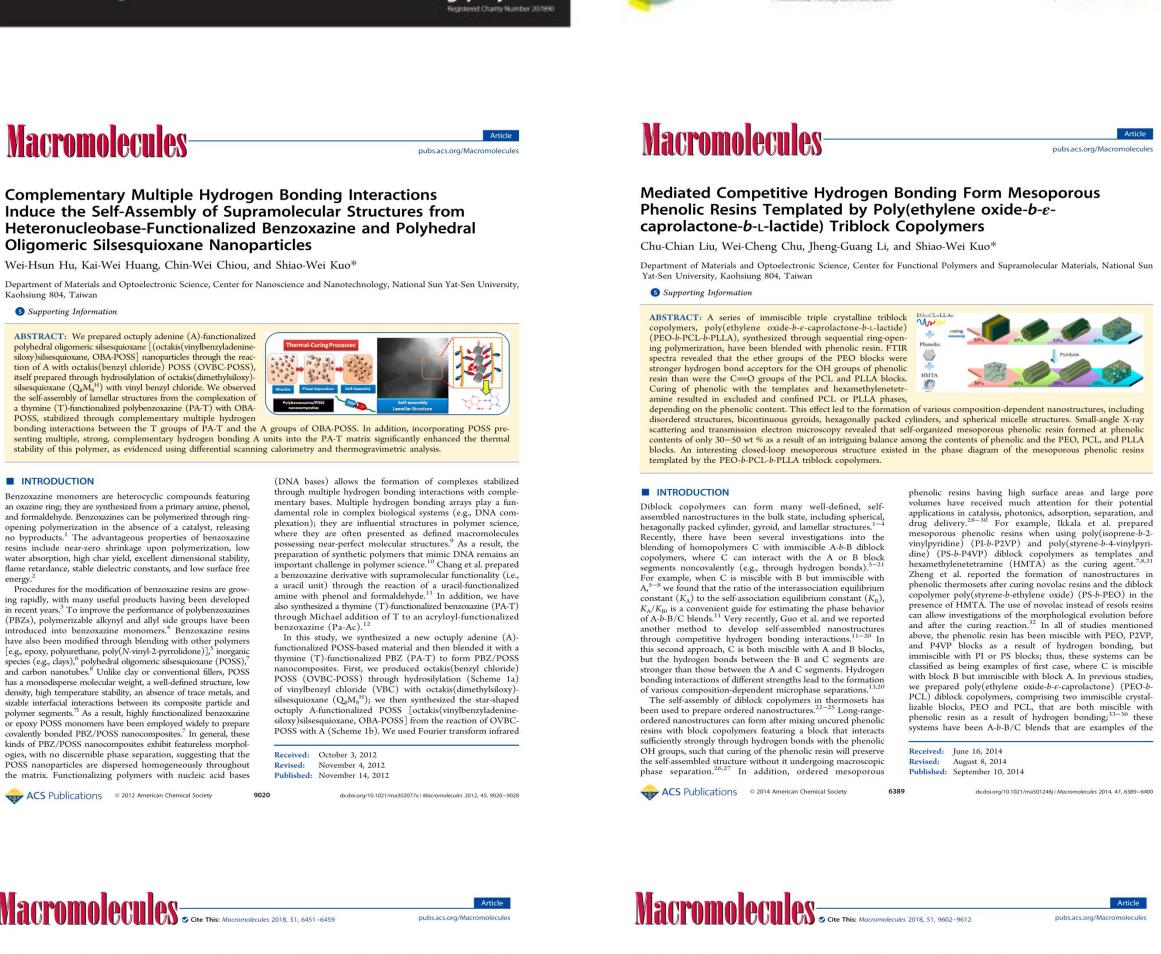


a typical polybenzoxazine; in addition, DDSQ-BZ-PDMS displayed high flexibility and transparency after thermal curing.

Functional Polystyrene Derivatives Influence the Miscibility and

Helical Peptide Secondary Structures of Poly(γ-benzyl L-glutamate)







KEYWORDS: hollow microsphere, hollow microtubule, carbazole, covalent organic framework, CO2 energy storage

under dynamic control. For 2D-COFs, the dynamic interplay Received: December 14, 2018

between covalent bond formation and noncovalent (π- Accepted: February 8, 2019

stacking) interactions plays an important role in controlling Published: February 8, 2019

Covalent organic frameworks (COFs) are a new family of crystalline porous organic polymers, possessing lightweight, periodic structures, high surface areas, high thermal stability, and specific pere size distributions 1-3 COFs are formally.

and specific pore size distributions. 1-3 COFs can form either conduction, sensing, catalysis, drug delivery, membrane

the crystallinity, structure, and properties of the formed COFs.

DOI: 10.1021/acsami.8b21867 ACS Appl. Mater. Interfaces 2019, 11, 9343–9354

1. INTRODUCTION

two-dimensional (2D) or three-dimensional (3D) structures

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|| Faculty of Materials Science and Chemical Engineering, Ningbo University, 818 Fenghua Road, Ningbo 315211, China

Department of Material and Optoelectronic Science, National Sun Yat-Sen University, 804 Kaohsiung, Taiwan

olism dynamical information can provide u

Recently, wearable health monitoring devices are increasingly

ual human. Over the past decade, a large number of powerful

them can only enable real-time monitoring of an individual's physical activities and some vital signs (such as respiration rate,

kin temperature and relative humidity, heart rate, and brain

ACS Publications © 2018 American Chemical Society 4343

ubstance to life on Earth and plays a vital role in human health. Received: April 16, 2018

In this regard, water molecules can be suitable candidates of Revised: June 10, 2018

signal source, because of their extremely important role in most Published: June 11, 2018

activity) by direct physical contact with applied pointers but fail

■ INTRODUCTION

¹Institute for Technical and Macromolecular Chemistry, University of Hamburg, Bundesstrasse 45, D-20146 Hamburg, Germany

reliable physiological and psychological monitoring by detecting the subtlest RH fluctuations on human skin in a noncontact

o provide insight into the users' health state at molecular levels the traditional moisture sensors, V-2V which further hampered

by noncontact and real-time detection of certain gas molecules
liffusing from the human body. 6-11 Water is an indispensable

humans' metabolism processes. Therefore, it is practically

feasible to obtain physiological and psychological information

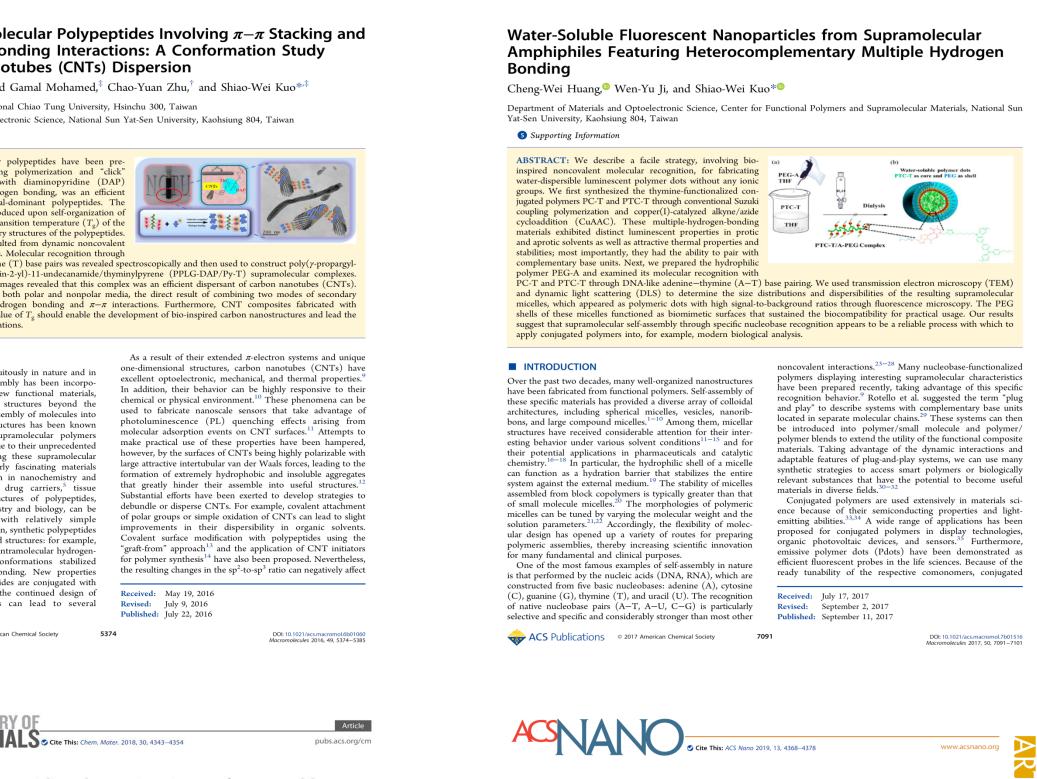
nd distribution of water molecules around the human skin

a long time, because there exist critical challenges of

surfaces and exhaled air. 12-16 However, this promising approach

aditional humidity sensors for humidity fluctuation detectin

the trade-off between the sensitivity and responsive velocity o





DOI: 10.1021/acsnano.8b09600 ACS Nano 2019, 13, 4368–4378

n the sensing devices. 14,15 In addition, elastomers with Received: December 19, 2018

ultrathin thickness could also be employed to function as

ACS Publications © 2019 American Chemical Society 4368

pneumatic camouflaging skins or robotic actuators to imitate



a method that can be used to fabricate controllable fibers

diameter, excellent pore interconnectivity, and high surface-to-

J. Mater. Chem. A, 2015, 3, 6835-6843 | 6835

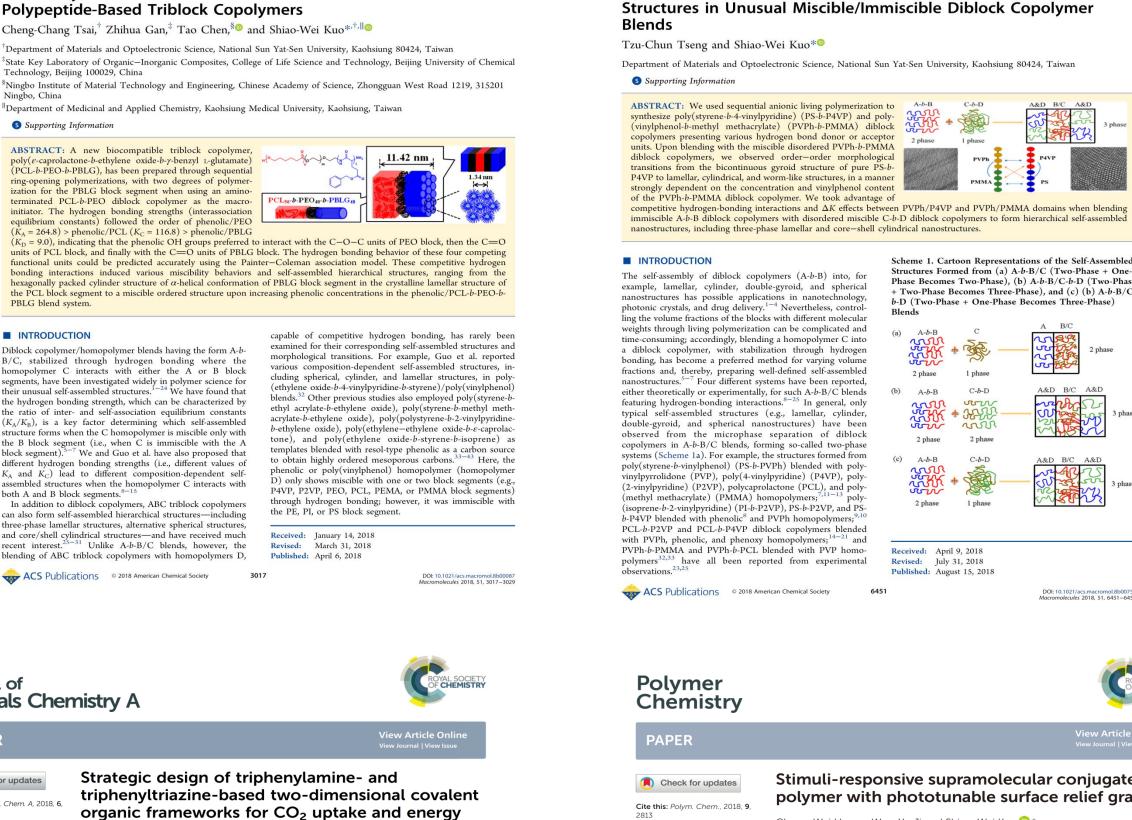
having diameters ranging from a few micrometers down to a

repartment of Materials and Optoelectronic Science, Center for Functional Polymers mate) metals and ceramics. These electrospun fibers are

and Supramolecular Materials, National Sun Yat-Sen University, Kaohsiung 80424, particularly attractive because of their high porosity, small

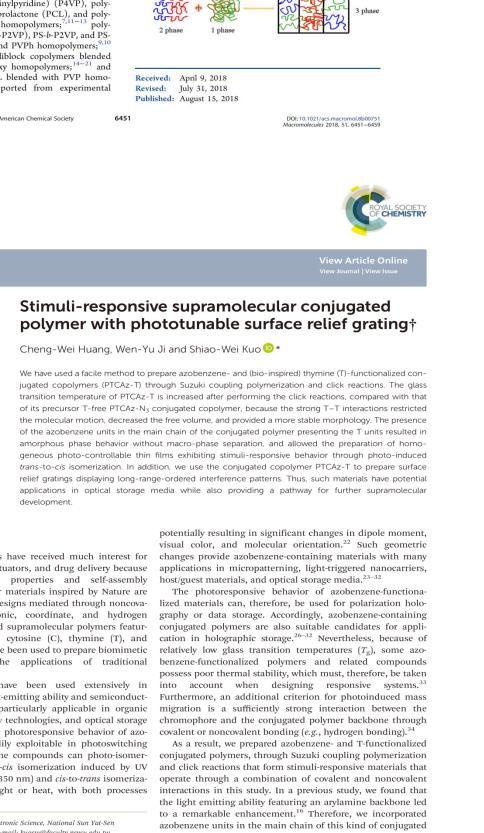
niversity of California, Berkeley, California 94720, USA

Electronic supplementary information (ESI) available. See DOI: volume ratio. 12



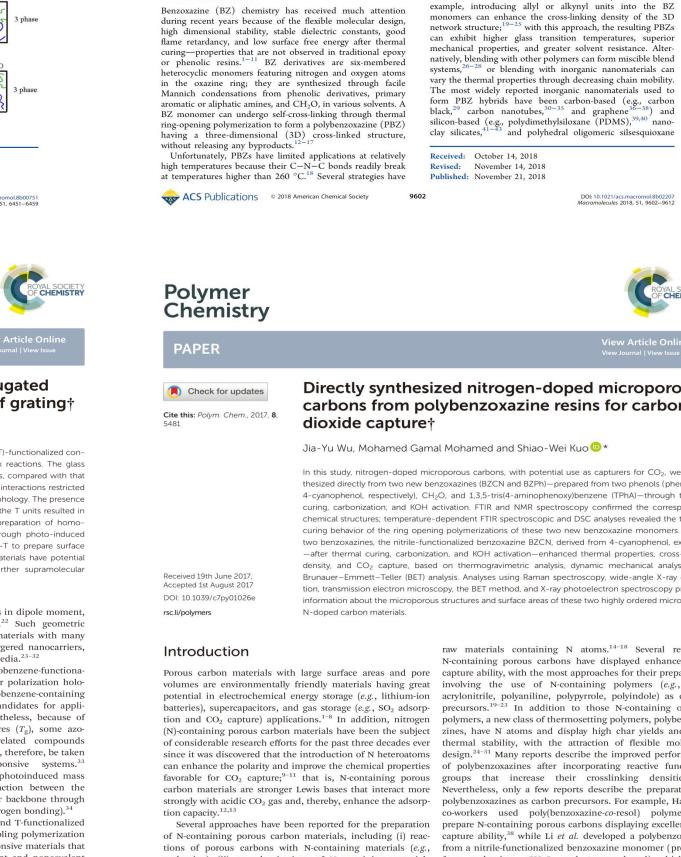


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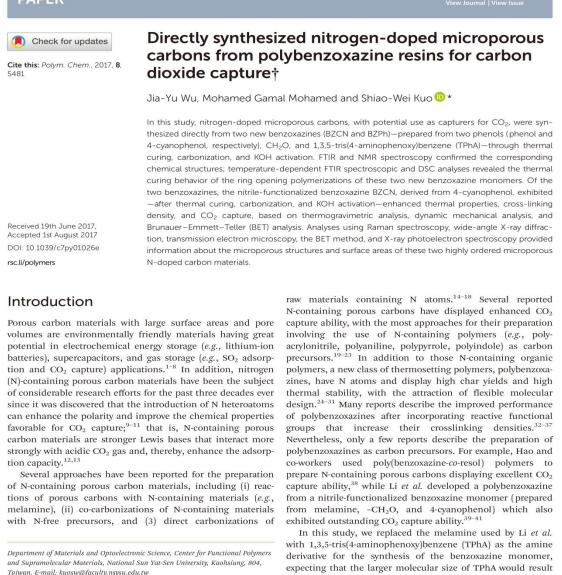
after, increase the diffraction efficiency. In addition, the com-

Polym. Chem., 2018, 9, 2813-2820 | 2813



the TPhA material (Fig. S1 and S2). See DOI: 10.1039/c7py01026e

This journal is © The Royal Society of Chemistry 2017



mentary information (ESI) available: Detailed NMR spectra of in larger pores in the final N-containing porous carbons. We

investigated the effect of the nitrile-functionalized benzoxazine

Polym. Chem., 2017, 8, 5481-5489 | 5481

Ortho-Imide and Allyl Groups Effect on Highly Thermally Stable

Wei-Cheng Chen and Shiao-Wei Kuo*®

Supporting Information

Polybenzoxazine/Double-Decker-Shaped Polyhedral Silsesquioxane

Department of Materials and Optoelectronic Science, Center for Supramolecular Materials and Functional Polymers, National Sun Yat-Sen University, Kaohsiung 80424, Taiwan

ABSTRACT: We synthesized double-decker silsesquioxane (DDSQ)-functionalized benzoxazine (BZ) monomers from a

DDSQ prepared with nadic anhydride (ND) through hydrosilylation (to form DDSQ-ND) and then its reactions with p-aminophenol and o-aminophenol to form DDSQ-ND-p-OH and DDSQ-ND-o-OH, respectively. Four different DDSQ-

DDSQ hybrids exhibited high thermal stability and high char yields after thermal curing, based on thermogravimetric analysis (TGA), because the DDSQ inorganic nanoparticles were dispersed homogeneously in the PBZ matrices, as evidenced using electron microscopy. For example, the thermal decomposition temperature ($T_{\rm d}$) and char yield of pBDDSQ-AN after thermal curing at 270 °C were 521 °C and 75 wt %, respectively. More interestingly, the char yield of the *ortho*-substituted *o*BDDSQ-

olybenzoxazole may have formed after such thermal treatment to increase the char yield, which was higher than that of the

T_d = 366 °C, char yield: 35.8 %

H₃C CH₃ H₃C CH₃

Polybenzoxazine/DDSQ Hybrids

High Thermal Stability

High Char Yield

T_d = 521 °C, char yield: 75.0 %

example, introducing allyl or alkynyl units into the BZ

can exhibit higher glass transition temperatures, superio

nechanical properties, and greater solvent resistance. Al

natively, blending with other polymers can form miscible blend

form PBZ hybrids have been carbon-based (e.g., car

silicon-based (e.g., polydimethylsiloxane (PDMS),^{39,40} na

ems, 26-28 or blending with inorganic nanomaterials can

most widely reported inorganic nanomaterials used to

Heating