How to Typeset Professional-Looking Manuscripts and Presentations

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***Typesetting** is the composition of text by means of **arranging letters** and **symbols**.*

Learning how to typeset is important for communicating your science precisely, consistently, and correctly.
Just like the proper use of grammar.

Would you submit a paper without capitalizing the first word of each sentence?
Would you submit a paper without using punctuation (e.g. periods and commas)?

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Consistency is Key

Be mindful of consistency in:

- Typeface (*e.g.* Arial vs. Times New Roman)
- Font (size, italics, bolding)
- Symbols
- Spacing
- Units
- Justification
- …

What should be consistent?

- Paragraphs with other paragraphs
- Titles with other titles
- Figure captions with other figure captions
- Placement of in-text citations
- All references within the bibliography
- …

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Variables, Subscripts, and Superscripts

- All variables (scalars) and universal constants are *italicized*

  Temperature: T
  Fitting parameter: n
  Dispersity: $Đ$
  Boltzmann's constant: k

  > Do not just italicize everything because that's what equation editor defaults to!

- Vectors are **bold** and non-italicized

  Scattering wave vector: **q**   (*c.f.* magnitude of the scattering wave vector q)
  Unit cell basis: **a**, **b**, and **c**   (*c.f.* unit cell parameters a, b, and c)

- Superscripts and subscripts that represent labels or numbers are NOT italicized

  Number average molar mass: M_n
  Probability of selecting particle 1: p_1
  Avogadro's number: N_{Av}
  Ten to the power of two: 10^2

- Superscripts and subscripts that are themselves variables without a fixed value are *italicized*

  Molar mass of fraction i: M_i for all $i = 1, 2, …, n$

Symbols — Overview

Symbols, whenever possible, should be typeset in the same typeface as the surrounding text (*i.e.* not 'math mode')

Example:

Good: 'Common mathematical symbols used in manuscripts are α, β, and γ.'

Same typeface as the surrounding text

Bad: 'Common mathematical symbols used in manuscripts are α, β, and γ.'

Different typeface from the surrounding text

Arial vs. Cambria Math (math mode)

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- Degree signs are symbols,
  not superscript 'oh' or 'zero'

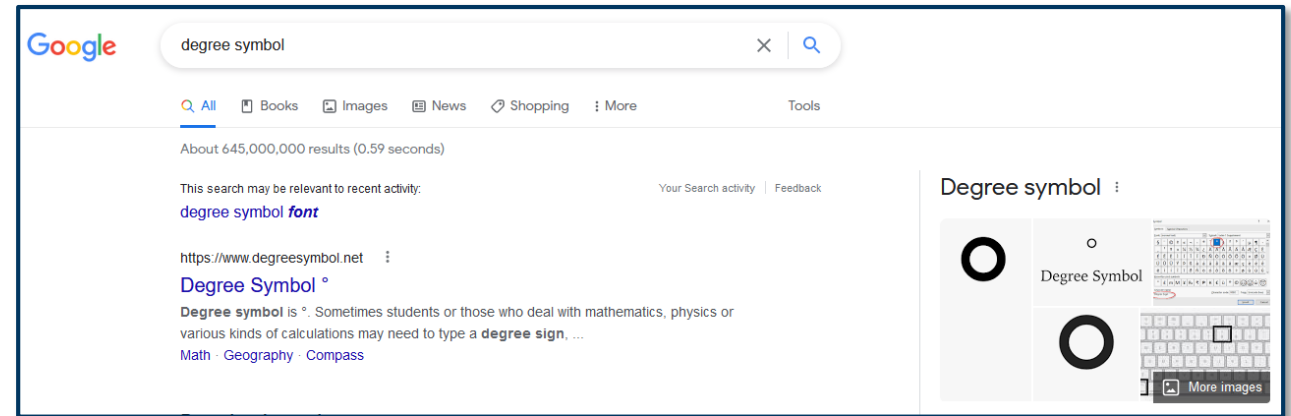 20 °C/min   20 ᵒC/min   20 ⁰C/min

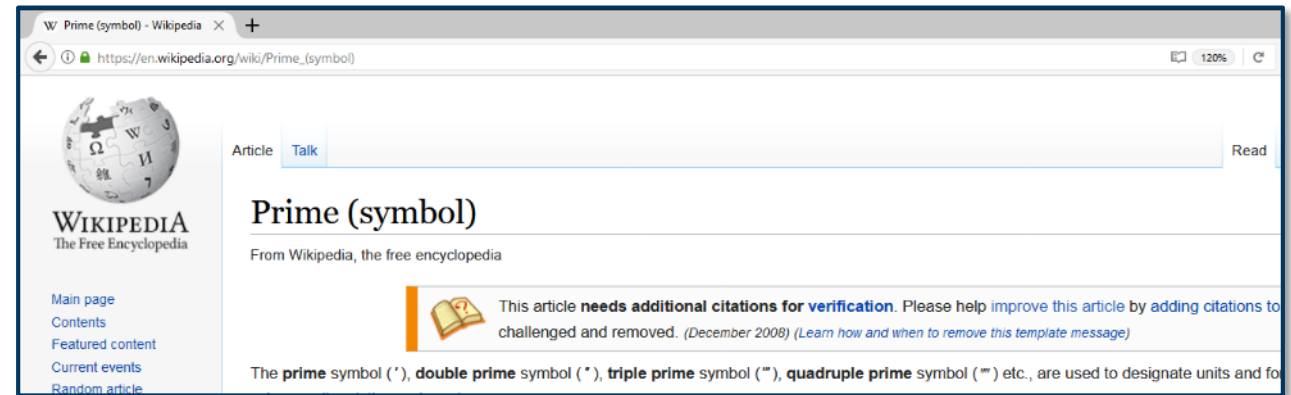 Correct   Incorrect   Incorrect

- "Prime" and "double prime" are symbols,
  not apostrophes or quotation marks

  G', G"   *G', G", G"*

  Correct   Incorrect

- Ellipsis … is a symbol,
  not three periods ...
  (notice the different spacing)

**Can copy/paste all of these into Word/Powerpoint
Double check the font!**

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Other Common Symbols

- Much-greater-than ≫ and much-less-than ≪ signs are symbols, not two greater-than or less-than symbols — *c.f.* >> and <<

- Angle brackets, *e.g.* families of directions ⟨123⟩, are symbols, not greater than and less than signs — *c.f.* <123>

- Times × is a symbol, not the letter 'x'

Dashes

Hyphen (shortest): -

Usage:

    Compound nouns
    Compound adjectives

'en dash' (medium): –

Usage:

    Minus signs
    Ranges of numbers
    Multiple names

'em dash' (longest): —

Usage:

    Parentheticals in middle of sentence
    Dash that separates two parts of a sentence

Examples:

    Mother-in-law
    Solid-forming reaction

Examples:

    The temperature is –10 °C.
    A broad ^{1}H NMR resonance in the range 3–4 ppm.
    Flory–Fox equation

Example:

    The brown fox — a type of animal commonly found in the forest — jumped over a rock.

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Dashes

The hyphen is on your keyboard!
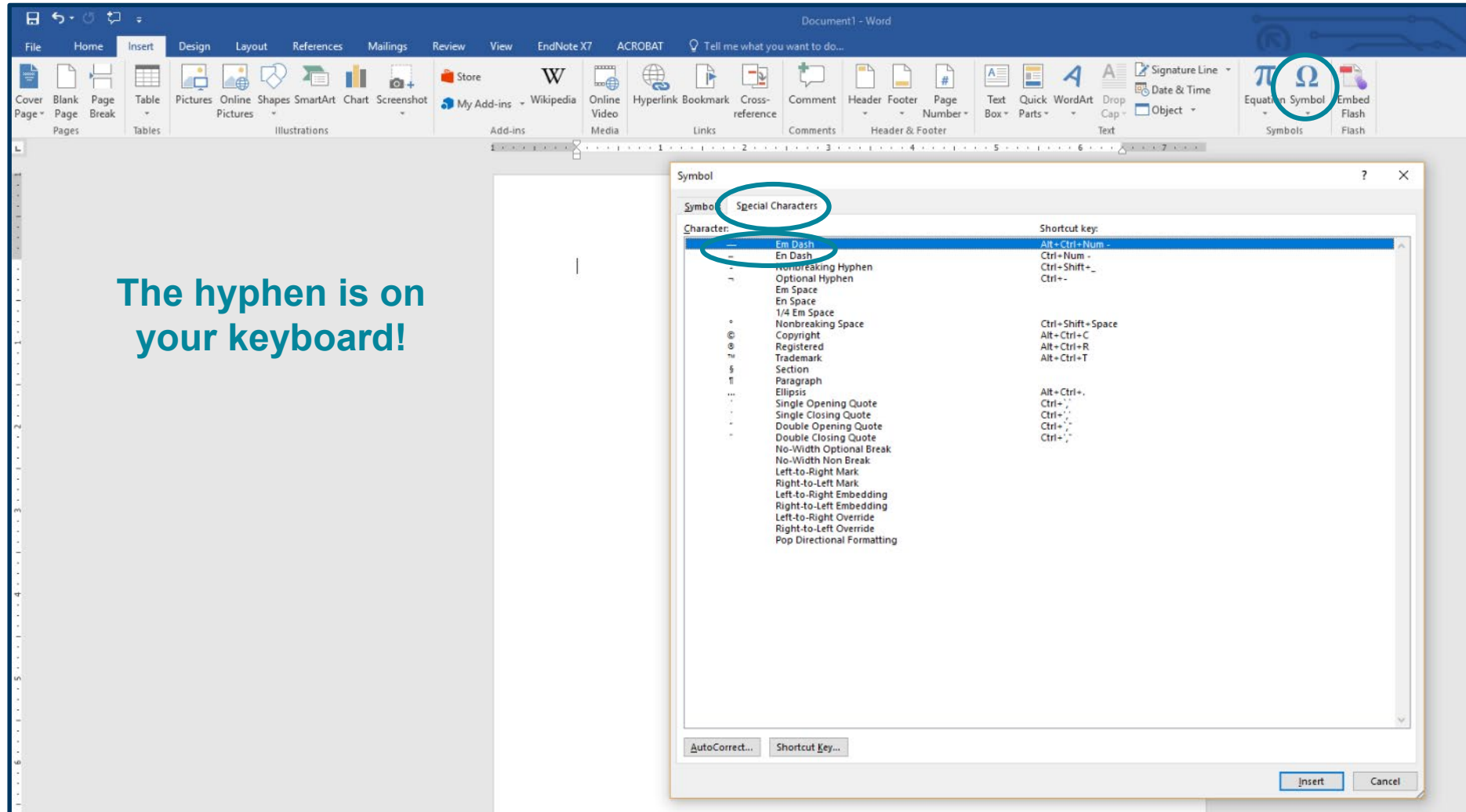
Can copy/paste all of these into Word/Powerpoint
Double check the font!

Always place a non-breaking space between a number and its units: 25 K, 32 min, 800 sec

What is a non-breaking space?

INTRODUCTION

Block copolymers (BCPs) have received considerable attention as materials that self-assemble into a rich array of nanoscale morphologies with applications ranging from advanced microelectronics to nanomedicine delivery systems.[1-4] The simplest sequence, an AB diblock copolymer, has been extensively studied by a synergistic combination of experiments and simulations, which have provided a comprehensive understanding of basic phase behavior. In contrast, as the number of blocks (n) and block types (k) grows even modestly, an exponential increase in synthetically tunable parameters renders the situation considerably more complex.[5] Primary factors that control equilibrium phase behavior include block volume fractions f_i (where i = 1, 2, …, n), degrees of polymerization (N_i), Flory interaction parameters (χ_{ij}, $i \neq j$), and statistical

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Normal space

Non-breaking space

ctrl + shift + space on your keyboard

Significance Statement

Lithium is a key ingredient in batteries, which are integral components of next-generation automobiles, airplanes, grid energy storage, and electronic devices. Unfortunately, lithium extraction from natural sources is laborious, slow, and costly, which motivates the search for more efficient isolation techniques. While polymeric membranes could, in principle, reduce the economic cost of lithium recovery, current membrane technology lacks sufficient lithium ion selectivity to be practical. To address this challenge, we introduce a new class of polymeric membranes that incorporate ion binding sites which significantly increase the selectivity of Li^+ over Na^+. These studies suggest important design rules to enhance the efficiency of membrane separations for lithium recovery and highlight the potential utility of incorporating specific interactants into polymer materials.

Introduction

Lithium is a critical element in contemporary energy applications due to its pervasive use in electrochemical technologies (1–3). For example, lithium-ion batteries dominate the rechargeable market due to the light weight, large reduction potential, and high energy density of lithium (4, 5). Societal demand for lithium will continue to rise as mobile technology expands, especially with the imminent rise of electric vehicles (6–9). The majority of lithium is currently mined from pegmatite deposits and close-basined brines, with brines estimated to contain 58% of the world's identified lithium reserves (1, 10). Unfortunately, the extraction of lithium from brines necessitates concentration by slow evaporation, a process that can take over a year (5, 11). An alternative source of lithium with concentrations comparable to brines (e.g., 100–1000 mg/L) (12–14) is the vast volume of produced water (10.6 billion liters per day in the U.S. in 2017) generated from oil and gas operations (15), although lithium recovery from these wastewater streams is uncommon. The development of new, energy-efficient separation techniques with higher

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detector and two Tosoh columns (TSKgel SuperHZM-N, 3 μm polymer, 150 × 4.6 mm) with chloroform with 0.25% TEA at 35 °C as the mobile phase. In this case, molar masses and molar mass dispersity (Đ) were determined against narrow PS standards (Agilent). SAXS and WAXS measurements were performed on a custom built SAXS/WAXS diffractometer housed at the University of California, Santa Barbara. The sample-to-detector distance was 1.7 meters for SAXS and 0.16 meters for WAXS with a fixed wavelength of 1.54 Å. For all SAXS and WAXS experiments, a silver behenate standard was used to calibrate the scattering angles. 2D data was reduced by azimuthal averaging to give $I(q)$ where I is the intensity in arbitrary units, $q = |\mathbf{q}| = 4\pi\lambda^{-1}\sin(\theta/2)$ is the magnitude of the scattering wave vector, λ is the wavelength of the incident beam, and θ is the scattering angle.

SCFT.

Mechanical Testing and STEM. Samples for mechanical testing and STEM were heat pressed using a Carver press (Wabash, IN) into a 0.5 mm thick steel rectangular mold with 3000 lbf at 200°C for 15 minutes and then quenched to room temperature. For STEM, polymers were cut into ultrathin (≈100 nm) sections by cryo-ultramicrotoming at -100°C and imaged without staining. For bot monotonic and step-cyclic tensile tests, a dog bone cutting die was used to punch out samples of the correct geometry (gauge depth = 0.5 mm, gauge width = 1.5 mm, gauge length = 10 mm, 2.5 mm transition zone radius). Tests were performed using using a custom-built setup with a vertical TwinRail positioning table (Lintech, CA) and a 10 N load cell (LSB2000 Miniature S-Beam, FUTEK, CA). A deformation rate of 10 mm/min was used for all test (strain rate = 1 min^{-1}). Step-cyclic tensile tests were brought to zero force between cycles by increasing the minimum applied strain as the specimens were deformed.

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Random change in spacing

Random change in justification

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Inconsistent tab size

With the synthetic modularity, tunability of photophysical and chemical characteristics, and the large range of photoswitches available at this time, these light-responsive organic molecules are extensively applied within many fields from materials science to medicine and device development. Moreover, this field continues to expand with the need to create and apply organic photoswitches with specific physical characteristics (e.g solubility in more polar solvents or water solubility for biological applications) or to improve the characteristics of photoswitches (e.g reversibility, stability of metastable isomer after irradiation, improving PSS) through careful synthetic design.[45]

1.3 An introduction to azobenzene, a dye compound with wide application

Azobenzene, a diazene derivative with phenyl groups on both ends, has been a substantial choice within the organic photoswitch literature for creating light-responsive organic materials. This is due to azobenzene's ease of synthesis and reversible change in sterics and electronics with isomerization. This isomerization occurs between a *trans*-isomer (phenyl rings are on opposite sides of the N=N bond) and a *cis*-isomer (phenyl rings on the same side of the N=N bond) (**Figure 1.6**). Discovered in 1834 by Eilhard Mischerlich,[56] azobenzene (*trans*) was initially applied to the dye industry as it was found that azobenzene dyes did not fade with ambient light exposure and offered a range of colors with installation of substituents on the phenyl ring. In 1937, G. S. Hartley reported the existence of a second form upon exposure to sunlight that was "much more in favour of the more polar [solvent]," concluded to be the more polar *cis*-isomer of azobenzene.[57] In addition to increased solubility in polar solvents, *cis*-azobenzene was also found to yield a higher

Citations either go (1) after punctuation or (2) before punctuation (varies by journal/personal preference).

Be consistent — do not mix and match

In recent years, bottlebrush copolymers have emerged as a promising non-linear architecture for achieving novel materials properties. Bottlebrush copolymers are composed of polymeric backbone with densely grafted and chemically similar polymeric side chains , and can be easily prepared by ring- opening metathesis polymerization (ROMP) .[17,18] Bottlebrush copolymers differ from comb and other branched polymers in that the grafting density is sufficiently high to cause a large degree of steric crowding around the backbone[19]. As a result of this crowding, the sidechains and backbone adopt an extended conformation, leading to a low degree of entanglement,[20,21] a stretched conformation,[22,23] and large domain spacing in block brush copolymers.[24–26] Bottlebrushes have interesting physical and mechanical properties that make them attractive materials for a diversity of applications: photonics,[27,28] drug delivery,[29,30] battery membranes,[31] lithography,[32,33] and dielectric elastomers.[34]

Inconsistent use of before/after and spacing

Sloppy!

Be consistent and double check journal names, titles, etc., **even if you use reference software!**

Use CASSI journal abbreviations

https://cassi.cas.org/search.jsp

(6) Hückstädt, H.; Göpfert, A.; Abetz, V. Influence of the Block Sequence on the Morphological Behavior of ABC Triblock Copolymers. *Polymer (Guildf).* **2000**, *41* (26), 9089–9094.

These are not the journal names
(although they came from downloading the references!)

28. Vatankhah-Varnosfaderani, M. *et al.* Chameleon-like elastomers with molecularly encoded strain-adaptive stiffening and coloration. *Science (80-.).* **359**, 1509–1513 (2018).

- Size of a space after subscript/superscript

Table S1. Molecular characterization data for P4MCL-*b*-PDDA-*b*-PTFEA parent triblock terpolymers.

Entry[a]	DP_L[b]	DP_D[b]	DP_F[b]	$M_{n,L}$[b]	$M_{n,D}$[b]	$M_{n,F}$[b]	$M_{n,BCP}$[b]	$Đ$[c]	f_L[d]	f_D[d]	N[e]
LDF-22	65	74	103	8.3	16	16	40	1.13	22	47	-
LDF-19	65	74	148	8.3	16	23	47	1.14	19	41	-
LDF-43	132	51	84	17	12	13	42	1.15	43	33	-
LDF-18	70	110	105	9.0	26	16	51	1.11	18	58	-
LDF-17	60	52	209	7.1	10	32	49	1.06	17	26	-

[a]Samples are referred to as LDF-*YY* where specifies the L-block volume percent (i.e., $f_L \times 100$) [b]Degree of polymerization (DP) and number-average molar mass reported in (kg/mol) of each block determined from ^{1}H NMR end-group analysis. [c]Dispersity in molar mass determined by SEC using conventional calibration in chloroform relative to linear PS standards. [d]Average volume percent of based on reported homopolymer densities at 25 °C (1.03, 0.943, and 1.403 g/cm³ for L, D, and F, respectively[1]) and ^{1}H NMR. [e]Volumetric degree of polymerization based on reported homopolymer densities and the reference volume, $v_0 = 118$ Å³.

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Notice the space to the left of × is more balanced with the space on the right (no longer unintentionally subscript)

- Punctuation after italicization or bolding

Levi,**...**, **Blankenship,** et al., *Macromolecules*, 2020, 53, 702

Ellipsis and two commas have been unintentionally bolded before/after the name of interest

Common Pitfalls

- Inconsistent title capitalization

Title case   vs.   **Sentence case**

Title case means *the first letter of each word is capitalized*, except for certain small words.

Sentence case means *only the first letter of the first word is capitalized* (plus proper nouns).

This is the Title of My Paper
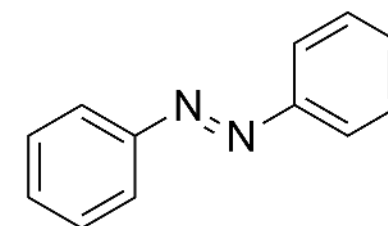
This is the title of my paper

Common Pitfalls

- Don't use possessive nouns for inanimate objects

Chapter 1. Azobenzene's potential utility in photoresponsive ionic materials

1.1 The advent and advantages of stimuli and light-responsive polymeric materials.

Polymers are essential to our everyday life, from the countless plastic products we use (containers, bags, shoes, cups, plates, TVs, cars, etc.), to directing and underlying our biological life (DNA, RNA, proteins). Elucidated by Hermann Staudinger in 1920, a polymer or *Makromoleküle* is a "long thread-shaped molecule," high molecular weight molecule consisting of similar subunits bonded together (known as monomers)[1] (**Figure 1.1**). Since Staudinger's founding of the field of polymer chemistry and Nobel Prize in 1953 for his discoveries in the field of macromolecular chemistry, the study and understanding of polymers and the variety of polymeric structures we can synthesize has significantly expanded, with synthetic methods to control the branching, the degree of polymerization (and length of the polymer), and attach the functional groups to imbue polymeric materials with specific chemical and physical properties.[2]

Azobenzene is not alive

- Pasting from Microsoft Excel can screw up subscript/superscript alignment

Table 1: Summary of Physical Characterization of PLLA-PMCL $A(BA')_n$ Miktoarm Star Polymers

Star	$f_A^{\,a}$	$M_{n,A}^{\,b}$	$M_{n,B}^{\,b}$	$M_{n,A'}^{\,b}$	Target n	n^c vs. n^c	τ^d
$98(32\text{-}8)_9$	0.33	98	32	7.5	9	8.5	0.93
$98(32\text{-}8)_6$	0.40	98	32	7.5	6	5.6	0.93
$98(32\text{-}8)_3$	0.52	98	32	7.5	3	2.9	0.93

[a]Calculated from ^{1}H NMR using $\rho_{PLLA}= 1.25$ g cm^{-3} and $\rho_{PMCL}= 1.03$ g cm^{-3}. [b]Determined from ^{1}H NMR chain-end analysis. [c]Determined from volume fraction and M_n vs. M_n. [d]Calculated from $M_{n,A}/(M_{n,A} + M_{n,A'})$.

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- If your lines of text look inconsistently spaced, something weird is going on!

RESULTS AND DISCUSSION

Previously, we have discovered A15 in single-component diblock copolymer melts comprising poly(dodecyl acrylate) (PDDA) and poly(lactide) (PLA) blocks. SCFT study revealed that extreme conformational asymmetry between PDDA and PLA stabilized the A15. Our new question was whether A15 could be still observed and phase behavior would be changed when a simple but conformationally asymmetric diblock copolymer forms more complex architecture like $(AB)_n$ star block copolymers. To answer this question, we designed a new diblock copolymer poly(dodecyl acrylate)-*block*-poly(trifluoroethyl acrylate) (PTFEA) (Figure 2). Instead of lactide, TFEA was introduced as the second monomer for two reasons: i) PTFEA block can be prepared from photoinduced ATRP of TFEA, which allows the synthesis of complex star polymers due to its high control over molecular weight and dispersity, and end group fidelity; ii) short fluorinated side chain of TFEA would results in incompatibility with PDDA maintaining conformational asymmetry. Extent of asymmetric conformation and incompatibility can be quantified as ratio of statistical segment lengths ($\varepsilon = b_a/b_b$) and interaction parameter (χ), respectively. First, to determine statistical segment lengths, we prepared PTFEA and PDDA homopolymers using photoinduced ATRP that proceeded under UV irradiation in the presence of an aliphatic tertiary amine ligand (Me_6-Tren) and low concentrations of $CuBr_2$ (SI).

Typeface for the symbols has inadvertently changed

Common Pitfalls

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Typeface is now consistent

Some typesetting comes down to personal preferences and publisher style requirements.

The only choice that is wrong every time is ***inconsistency***.

Questions?