

Morphological regulation of PCL-*b*-PEO crystalline micelles



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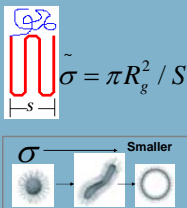
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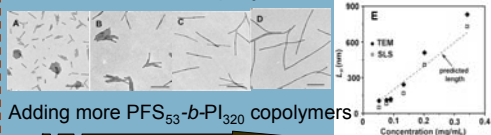
Introduction

Poly(ϵ -caprolactone)-*b*-poly(ethylene oxide) (PCL-*b*-PEO) can self-assembled into crystalline micelles in aqueous solution with various morphologies.

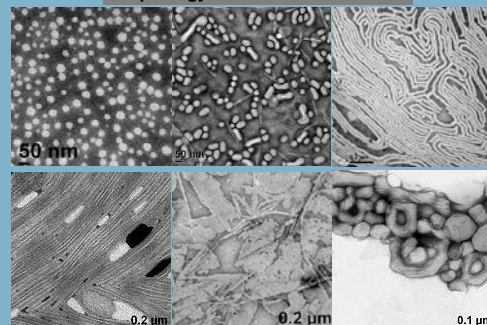
The morphology of the PCL-*b*-PEO micelles is related to the reduced tethering density of the corona, $\tilde{\sigma}$.



"Living growth" of crystalline micelles can be realized for PFS-*b*-PI, PLA-*b*-PAA and P3HT-*b*-PDMS copolymers.



Morphology of PCL-*b*-PEO micelles

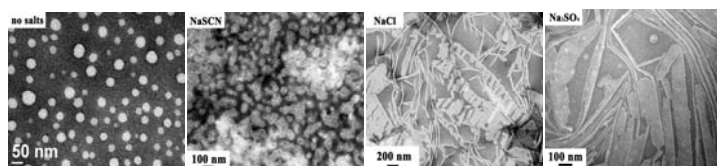


Morphological Transformations

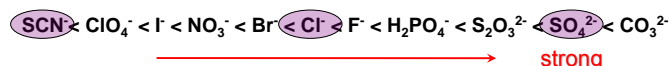
- The PCL₆₆-*b*-PEO₄₄ was first dissolved in THF (0.5 mg/ml). Then it is dialyzed against deionized water.
- Inorganic salts, acid or alkali was added into a pre-formed micellar solution.

Inorganic salt

- "salting-out" effect (H₂O in PEO coils is squeezed out).

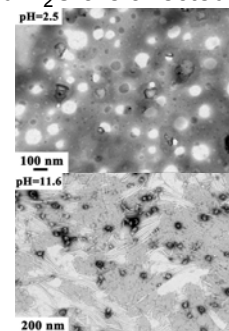
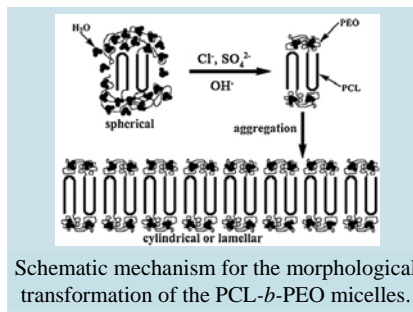


Hofmeister series salting-out effect

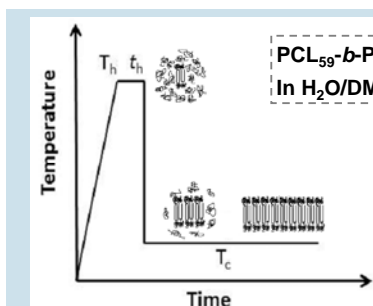


pH value changes

- H-bonds between PEO and H₂O are affected.

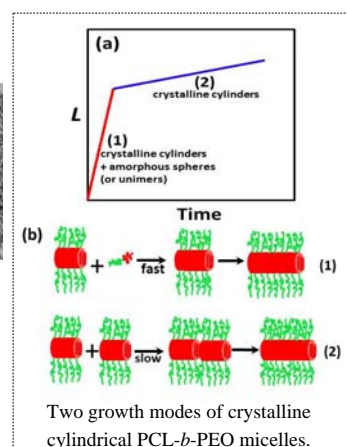
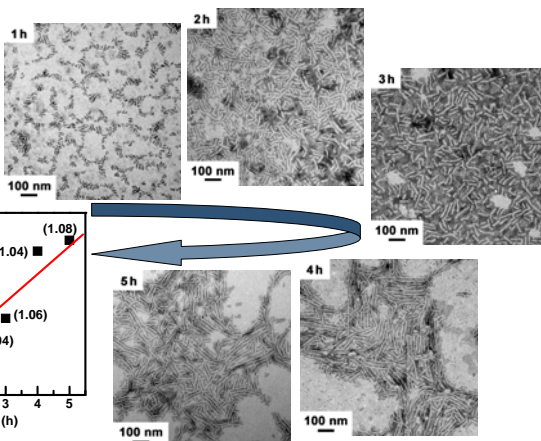
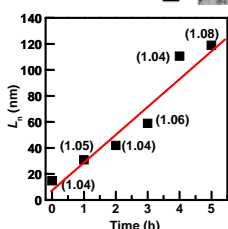


"Living Growth"



Schematic profile for preparation of the seed micelles and micellar growth.

PCL₅₉-*b*-PEO₁₁₃ micelles
In H₂O/DMF (5/1 v/v)



Conclusion

- Inorganic salts and pH values changes can trigger "sphere-to-cylinder" or "sphere-to-lamellar" morphological transformations for PCL-*b*-PEO crystalline micelles.
- "Living growth" can be realized for PCL-*b*-PEO crystalline micelles. Two growth modes have been observed.

Reference

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- Wang X S, Guerin G, Wang H, Wang Y S, et al. *Science*, 2007, 317, 644-647.
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Acknowledgement

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