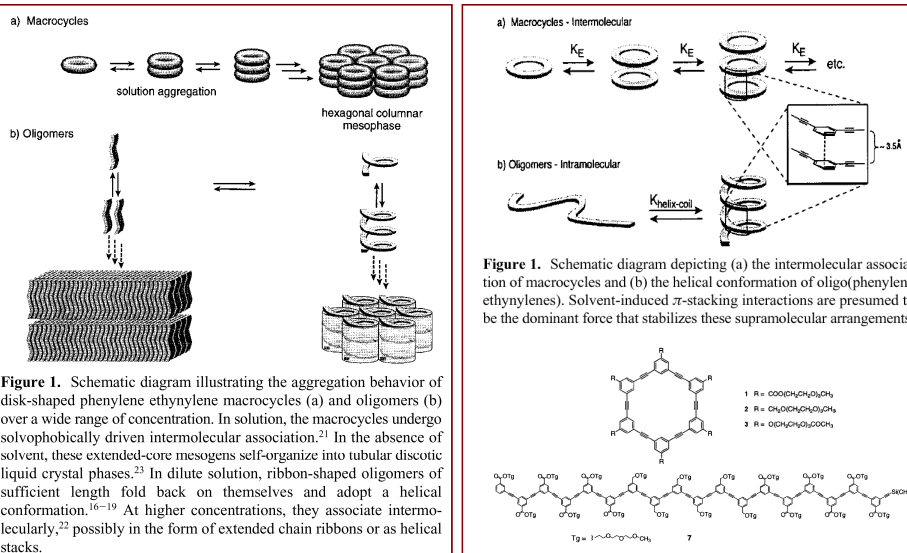


Novel Polymers: Narrow Distributed Stable & Soluble PA Block Copolymer Nanoparticles

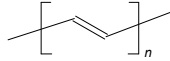
1 / 7

Various Equilibria Relevant to Amphiphilic Oligomers

Moore, J. S. *et al. J. Am. Chme. Soc.* **2000**, 122, 11315.Moore, J. S. *et al. J. Am. Chme. Soc.* **1999**, 121, 5933.

2 / 7

Polyacetylene (PA)



→ Representative Organic Conducting Polymer

(1958) Natta *et al.*

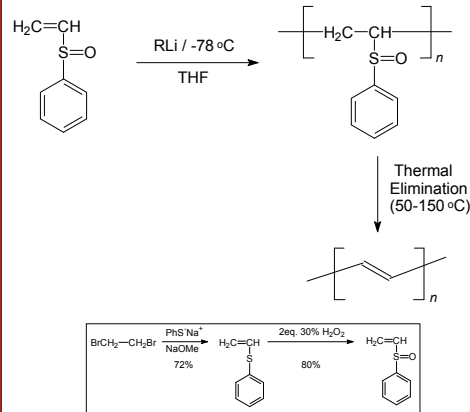
Catalyst: $\text{Al}(\text{Et})_3/\text{Ti}(\text{OPr})_4$

- Acetylene → Polymerization (all *trans*)
- At normal pressure and temperature
- In hydrocarbon solvents (e.g. *n*-hexane)
- *Black Flakes*

(1978) Shirakawa *et al.*

Catalyst: $\text{Al}(\text{Et})_3/\text{Ti}(\text{O}n\text{-Bu})_4$ (1/4)

- Acetylene → Polymerization (*cis* major)
- At -78°C , Pressure: 610mmHg or Higher
- In toluene (small amount)
- Film Thickness: 10^{-5} –0.5 cm
- doping with halogens and AsF_5



1) Leung, L. M. *et al. Macromolecules* **1993**, 26, 4426.

2) Kanga, R. S. *et al. Macromolecules* **1990**, 23, 4235 & 4241.

3 / 7

Stable & Soluble PA Block Copolymer Nanoparticles

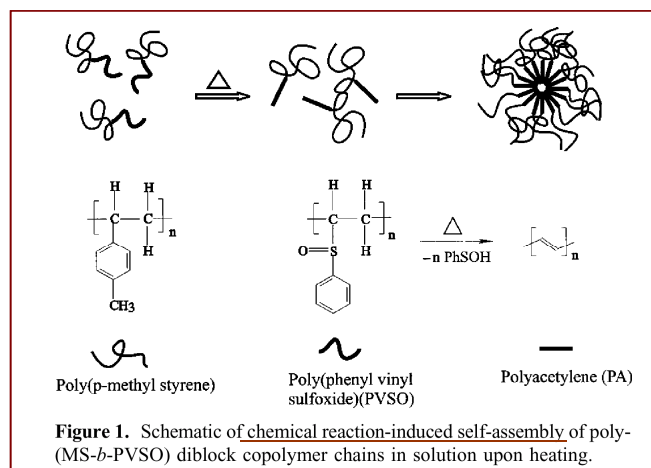


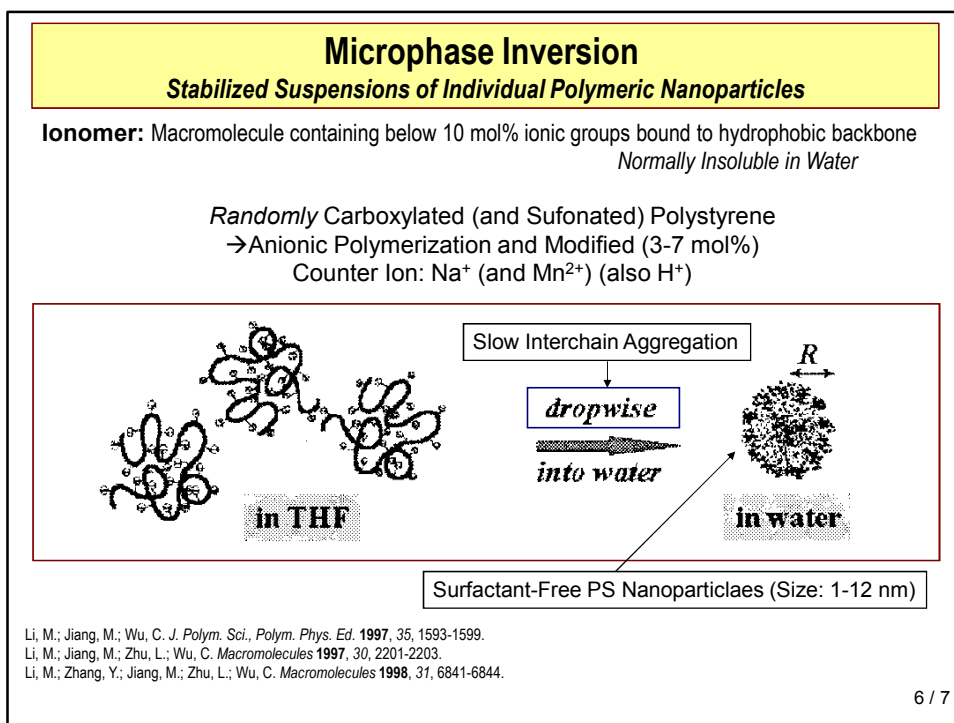
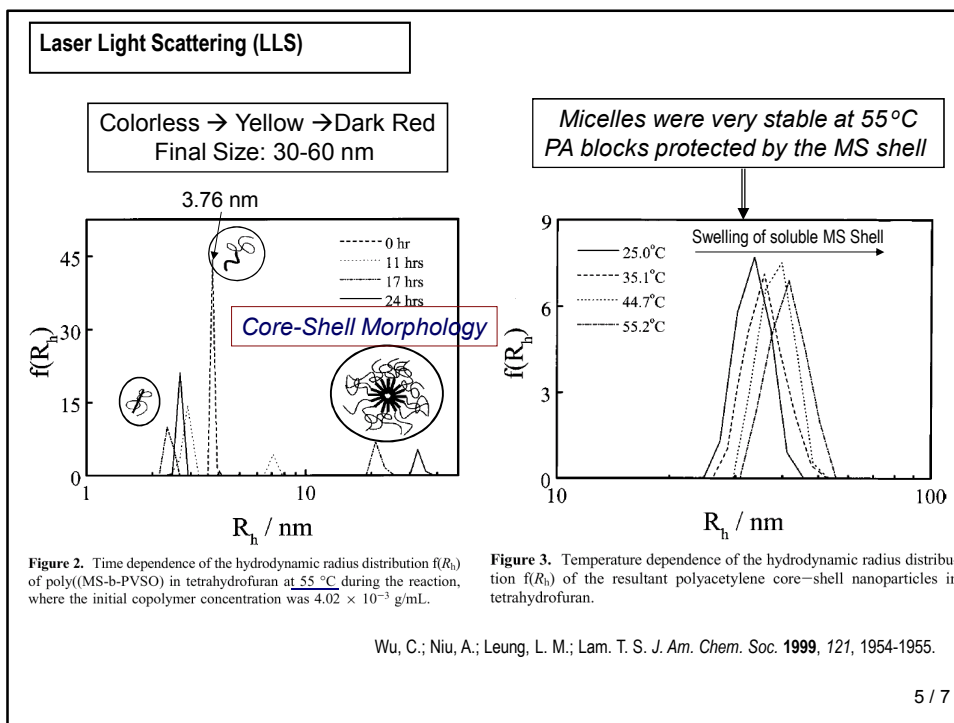
Figure 1. Schematic of chemical reaction-induced self-assembly of poly-(MS-*b*-PVSO) diblock copolymer chains in solution upon heating.

MS-*b*-PVSO copolymer (Initiator: *sec*-BuLi end-capped with 1,1-diphenylethylene)

($M_w = 17\,060$, PDI = 1.12, $n_{\text{MS}}:n_{\text{PVSO}} = 117:60$)

Used Solvent: THF

4 / 7



SUMMARY

- The assembly of polymer chains in solution is a powerful method leading to the preparation of interesting and unique macromolecular-based synthetic microstructure.
- The control of intra- and/or intermolecular interactions is provided through the selective placement of functional groups along the polymer backbone and the relative strengths of their ***attractive and repulsive interactions***.
- The stable & soluble ***PA Block Copolymer Nanoparticles*** were successfully produced in Core-Shell morphology. They are applicable as various shapes such as thin films and tubes.
- ***Surfactant-Free PS Nanoparticles*** (often used as emulsifier) are prepared via ***Microphase Inversion*** with Randomly carboxylated and sulfonated PS ionomers.

7 / 7