# Organic Nano-Materials Engineering

## Quiz #3 June 3, 2008

1. Define the following terms and suggest synthesis route(s) of each (by using a example). (20)

1. Block copolymer
2. Dendrimer

3. Discuss similarities and differences in their micelle formation behavior between block copolymers and low molecular weight surfactants. (20)

4. The self-assembly behaviors of block copolymers in ternary systems with water and oil change by different nature of interactions among components. Describe the effects of following factors on the self-assembled microstructure of block copolymer.

(Hint: Let’s assume the ternary system consist of water, xylene and Pluronic P105) (20)

(a) water/oil ratio

(b) molecular weight of block copolymer

(c) block copolymer composition (hydrophile/lipophile)



Pluronic P105

4. Suppose that you have two different kinds of diblock copolymers: one consists of coil-coil blocks and the other rod-coil blocks. Discuss the followings: (30)

(a) Differences in Flory parameter

(b) Differences in self-assembly behavior when i) TLC🡪i > Tg and ii) Tg > TLC🡪i for polymer melt and polymer solution, respectively. Here, TLC🡪i is the transition temperature of the rod block where liquid crystalline phase becomes isotropic phase, and Tg is the glass transition temperature of the coil block where glassy phase becomes rubbery phase or vice versa.

5. (challenge) (a) Suggest ideas how to make nanotubes based on dendrimers? (b) Suggest your own ideas about possible application areas of the nanotubular dendrimers as answered for (a). (30)

6. “Organic Nano-Materials Engineering” is a unique lecture for the student interested in the organic nanomaterials. Thus we have tried to introduce the broad fields of the organic nanomaterials science and engineering. Comment whether or not the lecture covers properly what you want to learn about the organic nanomaterials. If not, list the subjects that you are interested and want to learn from the lecture. (10)