

# ZERNIKE INSTITUTE COLLOQUIUM

Thursday, May 10<sup>th</sup>, 2012

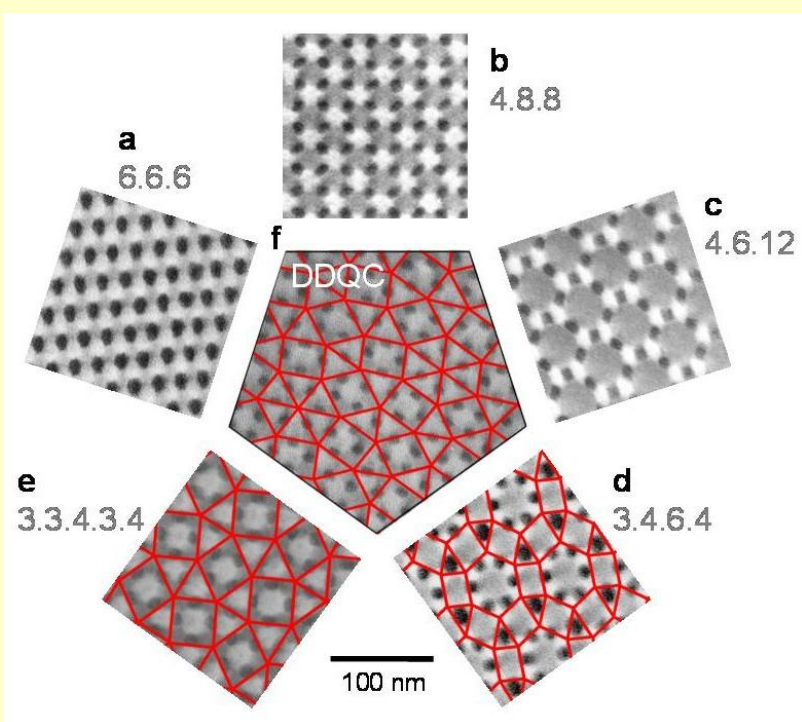
16:00h, Lecture Hall: 5111.0080

Coffee and cakes from 15:30h

## New Class of Self-Assembly in Complex Block Copolymer Systems

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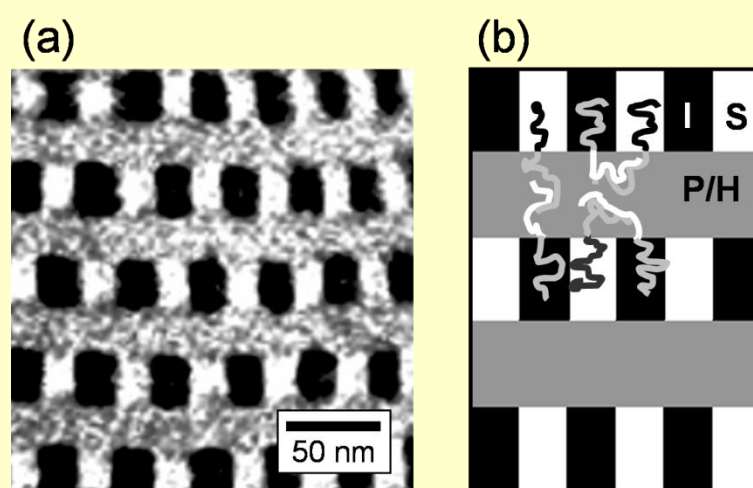


Block copolymers with incompatible components are known to show various microphase-separated structures depending on their molecular parameters such as molecular weight, composition and chain architectures. This lecture focuses on chain connectivity of block components by addressing the following topics:

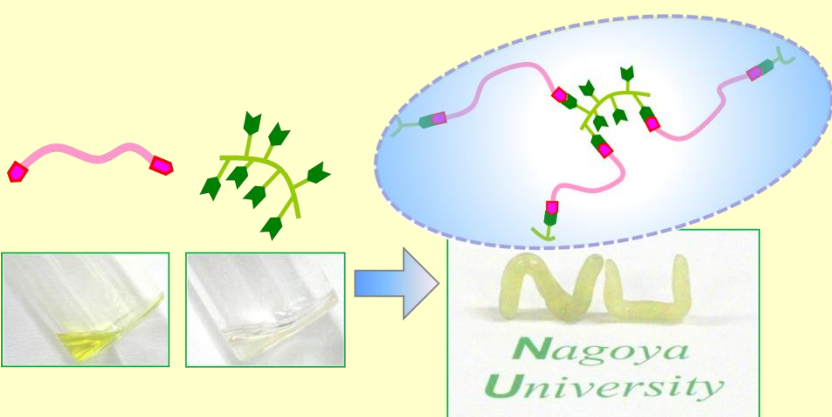
(i) ABC star molecules possess peculiar structure formation restriction, i.e., junction point have to be aligned on lines not on surfaces. And hence if chain lengths are similar, cylindrical structures are naturally formed, whose cross sections show various tiling patterns as are shown in the

Figure. Most of them are categorized as periodic Archimedean tiling patterns, which are composed of regular polygons. And some compositional perturbation was applied to the system, quasicrystalline tiling is appeared, as shown at the center of the Figure.

(ii) To the contrary, AB and CD two block copolymers, whose B and D components include hydrogen bond forming units, are blended, hierarchical structures can be easily formed. As an example, a three-phase structure from four components is displayed here, in which B and D are mixed into one phase(gray) and the mixed phase is periodically phase-separated from A(dark phase) and C(bright phase).



(iii) Finally telechelic carboxylic acid ended polymer and amine polymer is mixed in a proper solvent, supramolecular polymer gels being formulated spontaneously as is shown in the Figure, even two component polymers are basically liquid at room temperature, and these gels were found to be thermoreversible.



On the whole, many periodic and aperiodic structures are conformed from complex polymer systems based on their self-assembly manner, sometimes coupled with non-covalent bonding interactions.



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