IN-SITU LIQUID PHASE IMAGING OF BLOCK COPOLYMER VESICLE ASSEMBLY

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Key Words: block copolymer self-assembly; in situ electron microscopy; SCF; formation mechanism;

Amphiphilic block copolymers in aqueous solution can assemble into various ordered molecular architectures, which have a wide range of applications in, for example, drug delivery and catalytic nanoreactors.[1] While sustained efforts, both experimentally and theoretically, have been made to better understand the mechanism of self- assembly in order to gain more control over this process,[2, 3] there has never been a real-time, real space investigation of the assembly process on the nanoscale. Here we show the first observation of block copolymer vesicle assembly via the solvent switch protocol[4] using liquid phase transmission electron microscopy (LP-TEM). We also discuss the different mechanisms of self-assembly with the ex-situ cryo-TEM observation and compare them with self-consistent field (SCF) lattice calculations. Our findings illustrate the ability of LP-TEM to implement quantitative visualization of local formation process of the block copolymer vesicles to reveal the formation mechanism on an individual particle level.

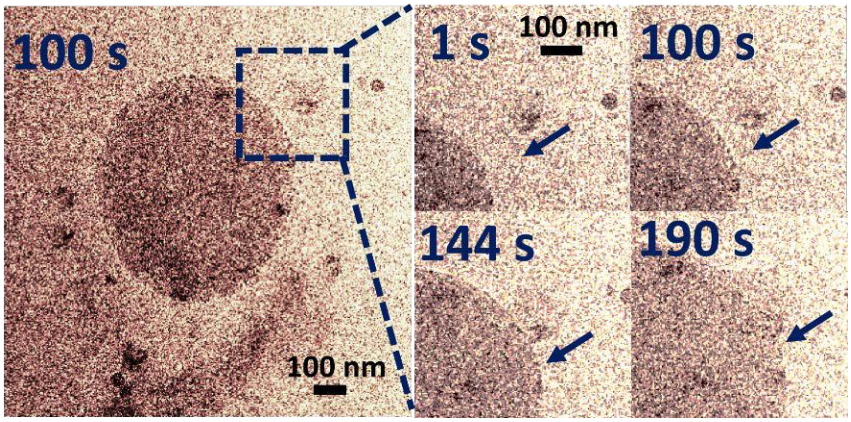

Figure 1 Snapshots from LP-TEM movie showing the formation of a dense liquid precursor phase in the formation of PCL-b-PEO vesicles by acetone→water solvent switch.

References

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