**Effects of Depletion Interactions on Self Assembly of Block Copolymer Micelles**

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**Scope of study**

- Block copolymer poly(styrene-b-isoprene) (SI) forms spherical micelles in diethyl phthalate (DEP), a solvent selective for polystyrene
- Micelles pack on ordered lattices like FCC or BCC in concentrated solutions
- Homopolymer polystyrene was added to the solutions and the phase behavior was studied by performing SAXS
- Goal of the experiments was to study the effect of molecular weight and concentration of homopolymer on the phase behavior of the micelles. Figure (a) shows a cartoon describing the problem.

**Observations**

- The ordered phases were disordered when homopolymer was added to the solutions. This phenomenon is analogous to depletion interactions observed in colloidal solutions
- Figure (c) shows the scattering pattern from the BCC lattice formed by 14% (by volume) of SI(50-13) micelles in DEP. When 2% polystyrene with Mw=180 kDa was added, the BCC lattice was replaced by the FCC lattice in solution.
- Neutron scattering experiments reported in the paper mentioned below suggest that aggregation number of micelles increases on addition of homopolymer as a result of which the BCC-FCC transition occurs.

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Figure a

![Figure a](image1.png)

Figure b

![Figure b](image2.png)