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## (I) Theory of Ordered Phases Self-Assembled from Soft Matter

*Monday 19 June 2023 16:00 (30 minutes)*

Intricate periodic and aperiodic ordered phases have been discovered in various soft matter systems such as supramolecular assemblies, surfactant solutions and block copolymers, underscoring the universality of emergent order in condensed matter. Theoretical study of block copolymer systems has been successful, revealing that the formation of complex ordered phases could be regulated by several mechanisms including conformational asymmetry, copolymer architecture and variety of the polymeric components. However, extending this success to non-polymeric soft matter systems is not straightforward and the study of the emergence of complex ordered phases in soft matter still presents an unsolved problem. We tackled this challenging problem by developing molecularly-informed Landau theory and density functional theory for various soft matter systems. In particular, we have demonstrated that the proposed theoretical framework can describe the emergence of complex ordered phases such as the networked phases and the Frank-Kasper phases. Our study provides an initial step for the development of a generic theoretical framework for the understanding of the universality of the phase behavior involving complex ordered phases in various soft matter.

### Keyword-1

self-assembly

### Keyword-2

complex ordered phases

### Keyword-3

Landau theory

**Author:** SHI, An-Chang

**Presenter:** SHI, An-Chang

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