Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **3725** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Phase behaviour of Polydisperse Diblock Copolymers

Monday 19 June 2023 16:30 (15 minutes)

Recent experimental and theoretical studies have shown that many ordered structures, ranging in complexity from simple lamellae to complex Frank-Kasper (FK) phases, can be formed from diblock copolymers. In many of the experimental studies the polymeric samples used in are polydisperse, however most theoretical studies have examined monodisperse systems. Therefore, to conduct theoretical studies on the phase behaviour of polydisperse block copolymer systems is desirable. In our study, the molecular weight distribution of AB diblock copolymers is modelled as a four component blend. Self-consistent field theory is used to study the effects of the shape of the molecular weight distribution (MWD). It is found that the width and skewness of the MWD, and conformational asymmetry, all have significant effects on the formation of the FK phases. The theoretical results provide insight to regulating block copolymer phase behaviours via designed molecular weight distributions and shed light on the formation mechanisms of the FK phases.

Keyword-1

Diblock copolymer

Keyword-2

Phase behaviour

Keyword-3

Polydisperse

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Session Classification: (DCMMP) M3-7 Soft Condensed Matter II | Matière condensée molle II (DPMCM)

Track Classification: Technical Sessions / Sessions techniques: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)