Combining Fast-Scan Chip-Calorimeter with Molecular Simulations to Study Polymer Crystal Melting

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Recent development of fast-scan chip-calorimeter techniques allows us to expand the time window of our Differential Scanning Calorimetry measurements on polymer crystal melting towards the mini-second scale, and to match with our high-efficient dynamic Monte Carlo simulations of lattice polymers on the parallel processes. We employed the commercialized Flash DSC to measure both reversible and irreversible melting behaviors of lamellar polymer crystals and compared the results with parallel molecular simulations. The reversible melting was monitored by the temperature-modulated DSC method [1]. The irreversible melting was monitored by the power-law heating-rate dependence of superheating [2]. The new insights on the microscopic mechanism of polymer crystal melting and growth at high temperatures were discussed.

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References

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