Apex-dependent Frank-Kasper phases from simple second-generation dendron assemblies

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Sophisticated sphere-packing such as Frank-Kasper (FK) phases have been emerged as the pioneering molecular structures to explore the self-assembly behaviors. Herein, we adopt a simple second-generation dendrons which is the optimal structures to promote the effect of apex functionality performing the rich development of FK phases. Despite all the identical dendritic wedges on body part of dendrons, the various sphere-packing phases are formed from the different apex functionalities which attune the core interactions. These sphere-packing phases are measured and traced by in-situ small-angle X-ray scattering and FT-IR spectroscopy. The electron density maps of sphere-packing phases are reconstructed from X-ray scattering data to analyze the characteristics of each phase. To establish the phase stability regime from the free energy balance of dendron assemblies, we apply enthalpic/entropic effects which accommodate the core interactions of apex functionalities. Our approach to modulating the core interactions in a basic second-generation dendron assembly envisions feasible strategy and primitive platform for manipulating diverse sphere-packing FK assemblies and quasiperiodic arrays.