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COLLOIDAL SELF-ASSEMBLING IN SPACE: RESULTS FROM CHINA SJ-10 RECOVERBLE SATELLITE

Abstract

Colloidal particle system was recognized as an ideal model system to study phase transitions, because compared with atoms, micron sized colloidal particles were large enough and moved sufficiently slow for the direct observation, thus observation of phase change and defect formation process on the "atomic" scale could be achieved. However, the sedimentation of large colloidal particles in gravity resulted in uneven concentration of colloidal systems. It was difficult to obtain direct in-situ observation results with microscope on earth to reveal the relationship among colloidal self-assembling process, local structure changes and colloidal phase transition. In microgravity, on the contrary, sedimentation and buoyancy convection no longer affect the colloidal self-assembling behavior. To study the colloidal self-assembling process in space, we designed Colloidal Material Box (CMB) payload aboard China recoverable SJ-10 satellite, which will be launched in April of 2016. By utilizing CMB facility, a serious of colloidal droplets with controllable sizes could be formed in space. With the vaporization of colloidal droplets, the droplet profile changes and colloidal particle movement in the droplet can be recorded respectively by a normal CCD and a CCD of microscope lens. In this paper, we will systemically introduce the design of CMB payload and the primary space experiment results.