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Hongwei Zhou, Shenghua Xu, Zhiwei Sun

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Real-time *in situ* observation of shear modulus evolution during Ostwald ripening of colloidal crystallization

Hongwei Zhou[1], Shenghua Xu[1, 2 *], Zhiwei Sun[1]

[1]*Key Laboratory of Microgravity (National Microgravity Laboratory), Institute of Mechanics, Chinese Academy of Sciences, Beijing 100190, China*

[2]*School of Engineering Science, University of Chinese Academy of Sciences, Beijing 100149, China*

Abstract

Real-time *in situ* observation of evolution of shear modulus during the crystallization and ripening of colloidal particles suspensions was conducted by using reflection spectrum and torsional resonance spectroscopy simultaneously. According to the structural information obtained by reflection spectrum, after the completion of nucleation, the crystallization can be basically divided into four stages: crystallization-dominated stage, crystallization and ripening coexistence stage, ripening-dominated stage and crystallization completion stage. Colloidal particles volume fraction significantly affects the duration of each stage. Our experiments showed that the ripening process is the main cause for the improvement of the mechanical strength (the increase of shear modulus). This observation is supposed to be associated with the diminishing of crystal interface as the result of the increase in crystallites size and the decrease in crystallites number during the ripening process. In

* Authors to whom correspondence should be addressed.

Electronic addresses: xush@imech.ac.cn Tel.: +86 10 82544099. Fax: +86 10 82544096.