

Development of techniques suppressing crystal growth for nanocrystals (particles) using amines

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Recently, the demand for cosmetics combined with nanomaterials is increasing to realize the quality that consumer's needs. By achieving the nano-sized materials for cosmetics, it is expected that stretchability, texture, and transparency will be improved in cosmetic efficacy and their nano-sized cosmetics enable to bring the active ingredient to the dermis. On the other hand, fullerene (C_{60}) is greatly expected to be used for cosmetic products owing to its antioxidant effects for human skins. In order to maximize the antioxidant effect, down-sizing of C_{60} is an effective way to penetrate C_{60} molecules into the dermis through the skin. Various techniques have been reported for preparing nanosized C_{60} crystals, however considering the penetration into the skin, a technique without using a surfactant is required. We have already succeeded in suppressing crystal growth of C_{60} nanocrystals by using amine compounds in the reprecipitation method which is a simple and convenient method to prepare the nano-sized various organic crystals under the atmosphere. And we have already prepared the many kinds of organic nanocrystals by the method and also controlled crystal sizes and shapes. However, the suppression mechanism of C_{60} crystal growth by amine compounds is not clear. Thus, in this study, it was found that carbamino compounds produced by the reaction of amino solvents and carbon dioxide play an important role in the suppression of crystal growth. By TGA and IR analysis of the obtained nanocrystals, it was revealed that C_{60} and a compound with a carbamino compound suppress aggregation between C_{60} nanocrystals.