

研究论文

溶液热历史对蛋白质晶体生长影响的内在原因研究

戴国亮*, 解莹, 康琦, 胡文瑞

(中国科学院力学研究所国家微重力实验室 北京 100080)

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摘要 从溶液中聚集体的角度研究了溶液的热历史改变生长出的蛋白质晶体的数目和尺寸的内在原因. 将在281 K和309 K下保存1 d的两组溶菌酶溶液按不同比例混合, 加入沉淀剂生长晶体. 随着高温溶液的比例增加, 生长出的晶体数目减少, 同时溶液中生长基元的尺寸增大. 在5周内, 采用动态光散射对281, 293和309 K三种温度下保存的溶菌酶溶液中聚集体的变化情况进行监测, 发现溶液中均存在大小不同的两部分聚集体, 称之为小聚集体与多聚体. 前者的尺寸基本不随保存时间而变化, 而后者尺寸随保存时间增加而减小, 减小的速度与保存温度有关. 多聚体的尺寸经过5周后和小聚集体基本相同. 研究结果表明, 处于无序聚集阶段的溶液的均一化程度和成核阶段生长基元的尺寸受到了溶液热历史的影响, 并最终对晶体的数目产生影响.

关键词 [热历史效应](#) [溶菌酶](#) [聚集体](#) [光散射](#)

分类号

Study of Intrinsic Reason of Effect of Solution Thermal History on Protein Crystal Growth

DAI Guo-Liang*, XIE Ying, KANG Qi, HU Wen-Rui

(National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences, Beijing 100080)

Abstract In this paper, the aggregates in protein solution were investigated in order to study the change inside bulk solution that affect the amount and size of protein crystal after suffering thermal history effect. Two groups of lysozyme solution stored at 281 and 309 K separately were mixed with different ratio and precipitation agent was added. It was found that the amount of crystals decreased as the increase of the ratio of the heated solution, and the size of the growth units in solution increased at the same time. The situations of aggregates in lysozyme bulk solution stored at 281, 293 and 309 K separately were investigated by dynamic light scattering method for 5 weeks. The results showed that there always existed two separated aggregate groups in bulk solution. The group with smaller size was called units and that with the larger size was called clusters. The size of units kept almost constant as the stored time period increased. However, the size of clusters decreased to almost the same size as that of units after 5 weeks. The size decreasing rate of clusters was dependent on the storage temperature. Our results indicated that the homogeneity of protein solution in the induction time period and the mean size of units during nucleation process were affected by thermal history, which would finally affect the number of crystals grown.

Key words [thermal history effect](#) [lysozyme](#) [aggregate](#) [light scattering](#)

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通讯作者 戴国亮 dspr@imech.ac.cn

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