

技术及应用

利用同步辐射X射线衍射研究家蚕的纺丝过程

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收稿日期 修回日期 网络版发布日期:

摘要 利用同步辐射广角X射线衍射对五龄家蚕、解剖后的蚕腺体, 以及脱胶丝进行了测试, 研究了干燥过程及拉伸过程中腺体内丝素蛋白有序态结构的演变。结果表明, 蚕头部吐丝口附近的纺丝液形成了与silk I、silk II晶体结构相关的有序排列; 湿态腺体在干燥过程中, 水分的流失也会导致丝素蛋白有序态结构的形成, 丝素蛋白构象转变成 β 反平行折叠, 并趋于形成完整的silk II层状晶体结构; 拉伸作用为丝素蛋白成纤的主要诱导因素, 并使丝素蛋白有序态结构发生改变。

关键词 [同步辐射](#) [广角X射线衍射](#) [家蚕](#) [成纤](#) [有序态结构](#)

分类号

Study on Spinning Process of Silkworm by Using Synchrotron Radiation X-ray Diffraction

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Abstract The spinning process of a fifth instar *Bombyx mori* silkworm was studied *in situ* by synchrotron radiation wide angle X-ray diffraction (SR-WAXD). Silk glands dissected out from the larvae, and degummed cocoon silk were also examined by SR-WAXD. The effects of drying and drawing on the development of ordered structure of silk fibroin in the silk gland were investigated. The results show that ordered structures related to silk I and silk II are formed in the spinning dope near the spinneret of the silkworm head. During drying process of the silk gland, dehydration results in the formation of ordered structure of silk fibroin. Its conformation transforms to anti-parallel β -sheet which tends to construct perfect lamellar crystalline structure of silk II during drying. In addition, drawing is another important factor to induce the formation of ordered structure of silk fibroin and resultant fiber.

Key words [synchrotron radiation](#) [wide angle X-ray diffraction](#) [silkworm fiber formation](#) [ordered structure](#)

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