

生物化学工程与技术

聚乳酸载药微球形成机理的模拟分析与实验研究

郭新东, 章莉娟, 钱宇, 周健

华南理工大学化工与能源学院

收稿日期 2006-9-28 修回日期 2006-12-14 网络版发布日期 2007-8-20 接受日期

摘要

对聚乳酸载药微球的形成过程进行了耗散颗粒动力学模拟和实验研究。载药体系以硝苯地平为模型药物、聚乳酸 (poly-lactic acid, PLA) 为载体材料、聚乙烯醇 (poly vinyl alcohol, PVA) 为稳定剂。通过研究, 提出了聚乳酸载药微球的形成机理, 认为微球形成过程可分为4个阶段, 即高度分散阶段、PLA分子聚集阶段、硝苯地平分子向微球内部扩散阶段和微球的形成及稳定阶段。机理分析和模拟表明, 微球对硝苯地平的包载量有一个临界值, 硝苯地平浓度低于该值, 几乎所有的硝苯地平分子都能扩散进微球的内部; 高于该值, 则部分硝苯地平分子难以扩散进微球内部, 而分散在介质中, 形成硝苯地平聚集体。

关键词

[耗散颗粒动力学](#) [介观模拟](#) [微球](#) [聚乳酸](#) [机理](#)

分类号

Mechanism analysis of poly-lactic acid microspheres formation by dissipative particle dynamics simulation and experimental study

GUO Xindong, ZHANG Lijuan, QIAN Yu, ZHOU Jian

Abstract

The dissipative particle dynamics (DPD) simulation method and experimental study were used to investigate the mechanism of poly-lactic acid (PLA) microspheres formation. Nifedipine was used as the model drug, PLA as the carrier, and poly vinyl alcohol (PVA) as the stabilizer, respectively. The mechanism of PLA microspheres formation was developed. The forming process of PLA microspheres consisted of four steps: (1) high dispersion, (2) aggregation of PLA molecules, (3) nifedipine molecules dispersion into the PLA matrix, (4) formation and stabilization of PLA microspheres, sequentially. Based on the mechanism analysis, it was pointed out that there was a maximum of the nifedipine content that the PLA matrix could carry. If the content of nifedipine was below the maximum, almost all the nifedipine molecules dispersed into the PLA matrix. However, when the nifedipine content exceeded the maximum, some nifedipine molecules would be repulsed outside the microspheres, resulting in surplus nifedipine molecules aggregation.

Key words

[DPD](#) [mesoscale simulation](#) [microsphere](#) [PLA](#) [mechanism](#)

DOI:

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(6910KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“](#)

[耗散颗粒动力学”的 相关文章](#)

▶ [本文作者相关文章](#)

- [郭新东](#)
- [章莉娟](#)
- [钱宇](#)
- [周健](#)