

FULL PAPERS

磷化镓纳米粒子的固氮

张兆春^{*}, ^a, 崔得良²

¹上海大学材料科学与工程学院, 上海 200072

²山东大学晶体材料研究所, 济南 250100

收稿日期 2004-9-27 修回日期 2005-5-30 网络版发布日期 接受日期

摘要 在温和条件下, 利用磷化镓纳米粒子进行了氮的还原反应,

即氮氨转化。对悬浮在水中的磷化镓粒子进行鼓氮处理,

纳氏试剂分光光度法证实了悬浮液中氨的存在。对鼓氮时间、氮气流速、

磷化镓用量与氨浓度的关系进行了研究。与未进行固氮的磷化镓纳米粒子相比,

在参与固氮的磷化镓粒子拉曼光谱中, 有两个散射峰 (分别位于 138cm^{-1} 和 182cm^{-1}) 的强度得到明显增强,

这两个散射峰可以归属为吸附于磷化镓粒子表面的氨的平动。红外光谱结果表明,

两种磷化镓粒子表面水分子的环境存在差异。由电子自旋共振结果可知,

镓自填隙离子不是磷化镓粒子固氮过程中的电子供给体。

关键词 [氮, 氨, 磷化镓, 纳米粒子](#)

分类号

Reduction of Nitrogen on Gallium Phosphide Nanoparticles

ZHANG Zhao-Chun^{*1}, CUI De-Liang²

¹ School of Materials Science and Technology, Shanghai University, Shanghai 200072, China

² Institute of Crystal Materials, Shandong University, Jinan, Shandong 250100, China

Abstract Under mild ambient conditions gallium phosphide (GaP) nanoparticles were employed to carry out the reduction of nitrogen. By using Nessler's reagent ammonia was detected in the slurry where the aggregated GaP particles were suspended in water and bubbled by pure nitrogen. Dependence of the concentration of ammonia upon bubbling time, velocity of the flow of nitrogen, and dosage of GaP particles was investigated. In comparison with the original GaP nanoparticles, the Raman scattering of the GaP particles undergoing the process of nitrogen fixation reveals that two sharp lines at 138 and 182 cm^{-1} , respectively, emerged from the broad continuum around $100\text{--}200\text{ cm}^{-1}$. These two lines might be assigned to the translational motions of ammonia adsorbed on the surface of the GaP particles. An assessment of the infrared spectra of the two GaP particles led to the conclusion that the environment of the two H_2O molecules was not identical. Analysis of the electron spin resonance results showed that the structure defect, gallium self-interstitial, was not involved in the nitrogen fixation of the GaP nanoparticles.

Key words [nitrogen](#) [ammonia](#) [gallium phosphide](#) [nanoparticle](#)

DOI:

通讯作者 张兆春 zhczhang@mail.shu.edu.cn

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(0KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [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“氮, 氨, 磷化镓, 纳米粒子” 的相关文章](#)

▶ 本文作者相关文章

· [张兆春](#)

· [a](#)

· [崔得良](#)