

## 低能离子与生物有机小分子相互作用机制的初步研究

王相勤,邵春林,姚建铭,余立祥,余增亮

中国科学院等离子体物理研究所.合肥(230031);中国科学院离子束生物工程中心

收稿日期 修回日期 网络版发布日期 接受日期

**摘要** 利用低能离子束( $N^{+}$ , $Ar^{+}$ 离子)辐照固态羧酸钠(甲酸钠)、(乙酸钠)、(苯甲酸钠)和固态嘧啶碱基两类样品,经电子顺磁共振谱(EPR)、富里叶红外光谱(FT-IR)的检测,结果发现,三种低能离子辐照后的甲酸钠样品中产生了 $[COO]^{\cdot-}$ 自由基和亚甲基( $CH_2$ ),氮离子辐照乙酸钠和苯甲酸钠样品后,形成了新的化学基团氰基(CN);同时,结合茚三酮反应,证明了辐照后的羧酸钠和碱基样品中还含有新的基团氨基( $NH_2$ ),给出了氨基的产生量与注入离子的剂量的相关曲线。

**关键词** [低能离子](#) [甲酸钠](#) [乙酸钠](#) [苯甲酸钠](#) [嘧啶碱](#) [顺磁共振](#) [付里叶变换](#) [红外分光光度法](#) [相互作用](#) [生物分子](#)

分类号 [064](#)

## Study on the action mechanism of low energy ions implanted in bio-organic micro-molecules

Wang Xiangqin, Shao Chunlin, Yao Jianming, Yu Lixiang, Yu Zengliang

Inst of Plasma Phys, CAS, Hefei(230031)

**Abstract** The sample of solid sodium carboxylic and three pyrimidinyls were implanted by different ion (such as  $N^{+}$ ,  $H^{+}$ ,  $Ar^{+}$ ) of the same energy. The induced damages were detected by EPR and infrared (IR), which showed that the  $CH_2$  group and  $[COO]^{\cdot-}$  radical ion were produced in the sodium formate sample implanted with  $N^{+}$ ,  $H^{+}$ ,  $Ar^{+}$  ions. By using highly sensitive ninhydrin reaction, it was proved that the  $NH_2$  group was produced in the three pyrimidinyls implanted with  $Ar^{+}$  ion beam. These results show that no matter what kinds of ions are used, new products including  $CH_2$  and  $[COO]^{\cdot-}$  groups can be produced in the implanted sodium formate sample. They may form from the rearrangement reactions of the target atoms. Above results are to examine the mass and energy deposition effects of low energy ion implantation. It was found that the new CN group and the  $NH_2$  group could be produced in the implanted sodium carboxylic by  $N^{+}$  ion beam. It is well known that the sodium formate itself has no N atom. Therefore, the produced  $NH_2$  group and CN group must result from the mass deposition effect of the implanted  $N^{+}$  ion. Above results are to examine the mass and energy deposition effects of low energy ion implantation.

**Key words** [SODIUM FORMATE](#) [SODIUM ACETATE](#) [SODIUM BENZOATE](#) [PARAMAGNETIC RESONANCE](#) [FOURIER TRANSFORM](#) [INFRARED SPECTROPHOTOMETRY](#) [INTERACTIONS](#) [BIOMOLECULE](#)

DOI:

通讯作者

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“低能离子”的相关文章](#)

▶ 本文作者相关文章

- [王相勤](#)
- [邵春林](#)
- [姚建铭](#)
- [余立祥](#)
- [余增亮](#)