

# 低能离子束辐照植物样品质量损失研究

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采用50 keV的N<sup>+</sup>对100 μm厚的芸豆切片和75 μm厚的Mylar(聚乙烯对苯二酸酯)高分子膜辐照,辐照剂量从1×10<sup>15</sup> ions/cm<sup>2</sup>到1×10<sup>17</sup> ions/cm<sup>2</sup>。利用高灵敏度的天平测量样品辐照前后的质量,得到了辐照后样品的质量变化。结果表明,当离子剂量大于3×10<sup>16</sup> ions/cm<sup>2</sup>时,切片样品的质量明显减少,并且质量损失随辐照剂量增加而增加;但Mylar膜样品在辐照剂量达到7×10<sup>16</sup> ions/cm<sup>2</sup>时仍没有测量出明显的质量变化。由测量的质量损失计算出50 keV的N离子轰击切片样品时溅射产额约为560 atoms/ion。结合植物样品的结构和分子组成特性对这种辐照引起的高溅射产额现象作了分析。

## MASS LOSS OF BOTANIC SAMPLES INDUCED BY LOW ENERGY N<sup>+</sup> IONS IRRADIATION

The exact mass of kidney bean slices and Mylar film was measured before and after the irradiation of 50 keV N<sup>+</sup>, with doses ranging from 1×10<sup>15</sup> ions/cm<sup>2</sup> to 1×10<sup>17</sup> ions/cm<sup>2</sup>. The result shows that the mass of kidney bean slices decreased 151 μg/cm<sup>2</sup> with the dose of 3×10<sup>16</sup> ions/cm<sup>2</sup>, while the Mylar films did not show visible mass loss up to the dose of 7×10<sup>16</sup> ions/cm<sup>2</sup>. The obtained sputtering yield is about 560 atoms/ion, which is much larger than the simulated result using TRIM96 Code. This high-yield sputtering phenomenon was explained according to the intrinsic structure and composition of botanic samples.

### 关键词

低能氮离子辐照(Low Energy N<sup>+</sup> Irradiation); 植物材料(botanic Material); 质量损失(Mass Loss); 溅射(Sputtering); 解吸(Desorption)