

低能离子在植物样品中长程穿透行为的研究

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采用透射法测量了一定厚度的植物样品在接受低能离子辐照时从其后表面出射的荷能粒子。所测样品包括30、50和100 μm 芸豆子叶切片和20 μm 的西红柿皮。测量结果表明低能离子在植物样品中存在长程穿透现象,在芸豆切片中的穿透深度至少可达60 μm ,此时穿透的概率很小,不大于 10^{-5} ;长程穿透的离子产生的损伤空间分布不均匀。样品的高能质子透射能谱显现辐照损伤不是特别严重,推测这种长程穿透的现象由植物样品本身的结构决定。

STUDIES ON THE LONG-RANGE PENETRATION BEHAVIOR OF LOW-ENERGY IONS IN BOTANIC SAMPLES

Knowing the possible penetration depth of low-energy ions in botanic samples is essential to understand the mechanism of crop breeding induced by low-energy ion implantation to dry plant seeds. Energetic particles penetrated through certain botanic samples with thickeners of 30 μm , 50 μm and 100 μm kidney bean slices and 20 μm tomato peel in low-energy ion irradiation have been detected with transmission measurement. The experimental results demonstrated that the penetrated depth of low-energy ions in these botanic samples such as kidney bean slices was at least 60 μm , which is much larger than the projectile range of such ions in normal solids samples. The probability of such long-range penetration was no more than 10^{-5} . The distribution of damage induced by long-penetrated ions was not homogeneous. The energy spectra of high-energy protons transmit through samples were also obtained. It indicated that the damage to the botanic samples during the irradiation was not severe and the long-range penetration of low-energy ions in the botanic samples may result from the special structure of the samples.

关键词

低能离子透射法(Low energy ion irradiation); 扫描隧道显微镜(STM); 高能质子透射能谱(Energy spectrum of high energy proton); 植物样品(Botanic samples)