

论文

InGaN太阳能电池材料电学与光学性质的辐射研究

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摘要:

研究表明,In<sub>1-x</sub>GaxN合金材料的能隙能连续地从0.7eV改变到3.4eV,使得该材料有可能成为太阳能全光谱材料系.研究发现这些合金材料的电学特性表现出用高能质子(2MeV)照射比当前常用的太阳能光伏材料如GaAs和GaInP有更高的电阻,因此,给受到强辐射的太阳能电池提供了巨大的应用潜力.实验观察到这种材料对辐照损伤具有不敏感的特征,该特征可用带边局域的平均振荡结合缺陷能给予解释.该缺陷能用In<sub>1-x</sub>GaxN合金的Fermi能级的稳态能描述.

关键词: 太阳能电池 InGaN 辐照损伤 光致发光 Fermi能级

The radiation research of electrical and optical properties on InGaN solar cell materials

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Abstract:

It is shown that the energy gap of In<sub>1-x</sub>GaxN alloys can be continuously varied from 0.7 to 3.4eV, which can make it possible for multi-junction solar cells materials to provide a full-sola-spectrum material system. It is found that the electronic properties of these alloys exhibit a much higher resistance to high-energy(2MeV)proton irradiation than the standard currently used photovoltaic materials such as GaAs and GaInP, and therefore offer great potential for radiation-hard solar cells. The observed insensitivity of the semiconductor characteristics to the radiation damage was explained by the location of the band edges relative to the average dangling bond defect energy represented by the Fermi level stabilization energy in In<sub>1-x</sub>GaxN alloys.

Keywords: solar cells InGaN irradiation damage photoluminescence fermi levels

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