

材料科学与工程

碳化硅晶体的可见近红外透射光谱分析

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摘要:

利用紫外可见分光光度计和红外光谱测量系统,在室温下分别测量了本征和掺氮6H—SiC单晶的可见和近红外透射光谱。由光谱分析可知,6H—SiC单晶在可见及近红外区是透明的,而掺氮导致SiC单晶在可见和近红外区都有吸收,掺杂还使得带隙变窄。利用透射光谱,得到6H—SiC单晶在可见和近红外区的色散关系曲线和色散方程。此外,对掺氮SiC晶体透射光谱的分析表明,在625nm处的吸收对应自由电子从氮原子引入的导带尾的低能级到更高能级的跃迁,在2500nm附近的透射率下降是由自由载流子吸收引起的。

关键词: 6H—SiC晶体 透射光谱 光学性质

Analysis of transmission spectra of 6H—SiC crystal in the visible and near infrared range

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Abstract:

Transmission spectra of intrinsic and N doped 6H—SiC crystals in the visible and near infrared range were measured by using the UV Vis spectrophotometer and infrared spectrum measurement system. Optical transmission spectra demonstrated that the 6H—SiC single crystal was transparent for visible and near infrared radiation. Compared with the 6H—SiC single crystal, it was also observed that nitrogen doping could make the band gap narrower, and the optical absorption of N doped SiC appeared in the visible and near infrared range. Also, dispersion curves were obtained by the transmission spectra, and the refractive indices were analyzed using the dispersion equation in the transparent region. In addition, spectra analysis showed that the absorption at 625nm corresponded to the free electron transition from the low energy level of band tailing induced by N doping to the high energy level in the conduction band, and the absorption of free carrier resulted in low transmission around 2500nm for nitrogen doped crystal.

Keywords: 6H—SiC transmission spectra optical property

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