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材料合成及性能

电沉积温度对碘化亚铜薄膜光学性质的影响

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摘要：以ITO导电玻璃衬底, CuSO₄、KI为反应溶液, EDTA为络合剂, 通过简单的电化学方法分别在40, 60, 80 °C的电沉积温度下成功制备出高定向的γ-CuI薄膜。讨论了不同沉积温度下碘化亚铜薄膜各项性质的差异, 作为比较还利用化学沉积方法在室温下合成了碘化亚铜粉末。利用X射线衍射图(XRD)进行结构分析, 场发射扫描电子显微镜(SEM)进行形貌观察。实验结果表明: 碘化亚铜薄膜由三角形纳米片构成, 沿(111)晶相择优生长。随着电沉积温度的升高, 颗粒的尺寸从2 μm减小到500 nm。不同电沉积温度制备出的碘化亚铜薄膜均在拉曼光谱上呈现出一个强的LO峰和一个微弱的TO峰, 峰的强度均随着电沉积温度的升高而增大。同时, 光致发光(PL)光谱的分析显示出强的近带边发射峰。CuI粉末在结构及形貌等性质上与CuI薄膜有一定的差异。

关键词：CuI薄膜 温度 结构 光致发光

Influence of Deposition Temperature on The Optical Properties of CuI Thin Films

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Abstract: Highly oriented γ-CuI thin films have been successfully prepared on indium doped tin oxide (ITO) glass substrate by a simple electrochemical process at different temperatures. For comparison, CuI powders are also obtained by a simple complex compound method. Analyses on phases and structures based on X-ray diffraction (XRD) and field emission scanning electron microscopy (FESEM) techniques indicate that the films are composed of CuI triangular facet nanocrystals with (111) preferred growth orientation, and decrease from 2 μm to 500 nm with increase of the deposition temperature. Furthermore, photoluminescence (PL) spectroscopic analysis shows a strong near band edge emission. It is also found that the CuI powders show some diverse in structural, morphology and optical properties compared with the CuI thin films.

Keywords: CuI thin films temperature structure photoluminescence

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