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以CuSe纳米粒子为催化剂制备超长ZnSe纳米线

熊 鹏，李焕勇，介万奇，李志鹏

(西北工业大学 材料学院，西安 710072)

摘 要：采用化学气相沉积的方法，以Zn粉末为原料，CuSe纳米粒子为催化剂，在Si衬底上成功制备了毫米级ZnSe纳米线。用X射线衍射、EDS和SEM对产物的结构、成分和形貌进行了测试与表征。结果表明：生长的ZnSe纳米线为立方闪锌矿结构，长度达0.35~0.7 mm，Zn和Se的摩尔比为10.97:，其室温光致发光谱显示在325 nm波长激发下，ZnSe纳米线在439 nm处呈现自由激子的强烈发射，表明生长的ZnSe纳米线具有高的结晶质量。纳米线生长符合氧化还原反应下的气液固生长机制，并证明Cu_3Zn合金充当了实际的ZnSe纳米线生长催化剂。

关键字： Ⅱ-Ⅵ族化合物；ZnSe；CuSe；纳米线；气液固生长机制

Synthesis of ultralong ZnSe nanowires with CuSe nanoparticle catalysts method

XIONG Peng, LI Huan-yong, JIE Wan-qi, LI Zhi-peng

（School of Materials Science and Engineering, Northwestern Polytechnical University, Xi’an 710072, China）

Abstract: The ultralong ZnSe nanowires were successfully synthesized by chemical vapor deposition (CVD) method on silicon substrates using Zn and CuSe nanoparticles as material and catalysts, respectively. The microstructures and morphologies of as-prepared nanowires were characterized by X-ray diffractometry, X-ray energy dispersive spectroscopy and scanning electron microscopy. The results show that the product is ZnSe nanowires with length of 0.35−0.70 mm and the mole ratio of Zn to Se is 10.97:. The photoluminescence (PL) spectrum of as-prepared ZnSe nanowires show strong excitonic emission at around 439 nm under 325 nm excitation wavelength at room temperature, which indicates that the ZnSe nanowires have good crystal quality. Under the redox effects, the growth mechanism of ZnSe nanowire accords with the vapor-liquid-solid (VLS) process, and Cu3Zn alloy is the growth catalyst.

Key words: Ⅱ-Ⅵ materials; ZnSe; CuSe; nanowires; VLS growth mechanism

地 址：湖南省长沙市岳麓山中南大学内　　邮编： 410083

电 话： 0731-8876765，8877197, 8830410　　传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn