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材料合成及性能

催化剂对热蒸发CVD法生长 β -Ga₂O₃纳米材料的结构及发光特性的影响

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摘要：用热蒸发CVD法制备了 β -Ga₂O₃纳米材料,探讨了Au催化剂对纳米结构和形貌的影响,并研究了其光致发光特性。X射线衍射(XRD)分析显示产物为单斜结构的 β -Ga₂O₃。扫描电子显微镜(SEM)测试表明:Au催化剂颗粒尺寸较小时,制备的产物为尺度均匀的 β -Ga₂O₃纳米线,宽度小于100 nm,长度为几微米至几十微米;增加催化剂颗粒尺寸时,制备出的 β -Ga₂O₃纳米结构的尺度变大,形貌由纳米线逐步形成纳米带、片等形状。 β -Ga₂O₃纳米结构在波长516 nm处有很强的绿光发光带,而且随着催化剂颗粒尺寸的增加,发光强度和峰位“红移”现象逐渐减弱。

关键词：Ga₂O₃ 催化剂 纳米结构 光致发光 红移

Influence of Catalyst on The Structure and Photoluminescence of β -Ga₂O₃ Nano-material by Thermal Evaporation

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Abstract: The beta-gallium-oxide (β -Ga₂O₃) nano-material was prepared from gallium and oxygen by thermal evaporation in the argon atmosphere. The X-ray diffraction (XRD) reveals that the synthesized products are monoclinic gallium oxide. When the sizes of Au catalysts are small, the breadths of the nanowires are less than 100 nm and the lengths are several micrometers. With the increasing of the catalyst particle sizes, the morphology of the products are gradually transformed into nanobelts, sheets and other shapes. β -Ga₂O₃ has stable emission at 516 nm under excitation of 325 nm. With the increasing of the catalyst particle sizes, the luminescence intensity and the red-shift are gradually weakened.

Keywords: gallium-oxide catalyst nanostructure photoluminescence red-shift

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