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论文

钪酸盐阴极发射物质相的研究

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摘要

用多晶X射线衍射方法, 研究钪酸盐阴极发射材料在烧结过程中物理化学变化。由BaO-CaO-Al_2O_3-Sc_2O_3组成的发射材料中, 在1000—1300℃内, 是Ba-Al-O和Ba-Sc-O体系与CaO的混合物; 在1300—1500℃内, 是Ba-Al-O和Ba-Sc-O体系互溶生成热力学上的亚稳定态的Ba-Al-Sc-O固溶体。先形成组成约为5BaO-Al_2O_3-Sc_2O_3物相, 属正交晶系, a=9.725(2)Å, b=8.698(3)Å, c=6.152(3)Å; 最后生成组成约为4BaO-Al_2O_3-0.5Sc_2O_3物相, 属四方晶系, a=14.4996(19)Å, b=4.4996(19)Å, c=5.0265(8)Å. CaO呈游离状态。

关键词 热阴极 钪酸盐阴极 发射材料 X射线衍射分析

分类号

STRUCTURE ANALYSIS STUDIES IN EMISSIVE MATERIALS OF THE BARIUM SCANDATE DISPENSER CATHODE

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Abstract

Physio-chemical reactions in emissive materials of the barium scandate dispenser cathode during the sintering process are investigated by X ray analysis with the aid of an X-ray diffractometer using CuKα radiation. The emissive materials of barium scandate are the compounds resulting from the reaction and sintering of BaO-CaO-Al_2O_3-Sc_2O_3 with a specified proportion. During the course of the investigation, it became clear that the formation of different compounds is very dependent on the firing temperature.The results of experiments indicate that the phases present at 1000--1600℃ are the compounds of Ba-Al-O system, Ba-Sc-O system and CaO; at 1300--1500℃ a solid solution of Ba-al-Sc-O system is found, which is formed from Ba-Al-O and Ba-Sc-O system by their mutual solubility and belongs to a quasistable state of thermodynamics. the solid solution is first formed to be an orthorhombic unit cell for about 5BaO-Al_2O_3-Sc_2O_3 with a=9.725(2)Å, b=8.698(3)Å, c=6.152(3)Å, and finally a tetragonal unit cell for about 4BaO-Al_2O_3-0.5Sc_2O_3 with a=14.4996(19)Å, c=5.0265(8)Å, and CaO is in the form of free state.

Key words Thermionic cathode Barium scandate dispenser cathode Emissive material X-ray analysis

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