

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第17卷 第6期 (总第99期) 2007年6月

 [PDF全文下载]

文章编号: 1004-0609(2007)06-0871-07

熔盐合成技术制备片状(Sr, Ba)TiO₃晶粒

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摘要:以KCl为助熔剂,采用熔盐合成技术制备片状(Sr, Ba)TiO₃晶粒,研究不同前驱体及反应方式对产物相组成和形貌的影响。结果表明:BaO与片状SrTiO₃反应可获得以(Sr, Ba)TiO₃为主相的产物,产物相在SrTiO₃表面无规则析出且非取向长大,经烧结后形成片状多晶团聚体;片状Sr₃Ti₂O₇与BaO和TiO₂反应所得产物也以(Sr, Ba)TiO₃为主,同时生成少量(Sr, Ba)₃Ti₂O₇相,产物中除片状(Sr, Ba)TiO₃晶粒外,还通过Sr²⁺置换由BaO与TiO₂反应所得块状BaTiO₃晶粒中的Ba²⁺、以及反应物溶解-反应-析出生成许多块状和无规则状小晶粒;对于两步合成工艺, Sr₃Ti₂O₇先与BaO反应可得到片状(Sr, Ba)₃Ti₂O₇,与TiO₂二次反应后得到片状(Sr, Ba)TiO₃晶粒;由于此方式没有生成块状BaTiO₃这一过程,产物中非片状晶粒数量大幅度减少。

关键字: (Sr, Ba)TiO₃; 片状晶粒; 熔盐合成

Synthesis of tabular (Sr, Ba)TiO₃ crystals by molten salt method

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Abstract: The tabular (Sr, Ba)TiO₃ particles were prepared in KCl flux by molten salt synthesis. The effects of precursors and reactive modes on the phase composition and morphology of products were investigated. The results show that the product with main phase (Sr, Ba)TiO₃ is obtained by reacting SrTiO₃ with BaO. The tabular aggregates are formed by sintering irregular grains that precipitate grow arbitrarily on the SrTiO₃ surfaces. (Sr, Ba)TiO₃ is also the main phase by reacting tabular Sr₃Ti₂O₇ with BaO and TiO₂. Besides the tabular (Sr, Ba)TiO₃ particles, many small non-tabular particles are generated from the substituting of Sr²⁺ for Ba²⁺ in BaTiO₃ formed by reacting BaO with TiO₂, or the dissolving-reacting-precipitating process. For two-step process, tabular (Sr, Ba)₃Ti₂O₇ particles are obtained by reacting Sr₃Ti₂O₇ with BaO, which further react with TiO₂ to form tabular (Sr, Ba)TiO₃ particles. Because no BaTiO₃ generates, the amount of small non-tabular particles decreases greatly.

Key words: (Sr, Ba)TiO₃; tabular template; molten salt synthesis

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