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用超纯铁精矿生产锶铁氧体预烧料及其焙烧动力学

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摘 要：锶铁氧体是应用最广的永磁铁氧体,当前其生产原料主要是铁红和铁鳞,但这2种原料来源有限,且价格昂贵,因此寻找质优价廉的锶铁氧体原料已成为当务之急.作者采用分散与选择性聚团磁选新工艺制备出w(Fe)=71.88%,w(SiO_2)<0.5%的超纯铁精矿.锶铁氧体预烧生产工艺是:采用超纯铁精矿氧化和铁氧体生成反应,在配比n为5.6,精矿粒度低于2μm,预烧温度为1 553 K,保温时间超过1 h和添加剂适量的工艺条件下,制备出比饱和磁化强度σS>71.5 A/(m2 · kg)的优质锶铁氧体预烧料.用缺陷化学理论和焙烧动力学进行分析,结果表明:Fe^{3+}和Sr^{2+}通过O_2-晶格互相扩散并以Sr^{2+}扩散为主,在$SrFe_{12}O_{19}$-Fe_2O_3,SrO-$SrFe_{12}O_{19}$界面发生固相反应,生成锶铁氧体.

关键字：超纯铁精矿;锶铁氧体;缺陷化学;焙烧动力学

Preparation of strontium ferrite powder by iron concentrate and its sintering dynamics

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Abstract: Strontium ferrite has been used widely. Nowadays, the main rawmaterials for strontium ferrite are Fe_2O_3andFe_3O_4, which are expensive and limited. So it is necessary to find newkinds of rawmaterials. Magnetite separation has been adopted to pretreat rawmaterials, and the superpure iron concentrate of w(Fe)=71.88%,w(SiO_2)<0.5% can be obtained. In the process of the preparation of strontium ferrite powders, the oxidation of the magnetite and the formation of strontium ferrite have been finished at the same time by using novel technique. Under the following condition, that is, molar rationis 5.6, size of concentrate is less than 2μm, sintering temperature is 1553 K, sintering time is more than one hour and properreagents, the strontiumferrite powderwithgood results such as σS>71.5 A/(m^2·kg) has been got. The study of the dynamics and the analysis of defect chemical theory on the reaction of the formation of strontium hexaferrites phase expresses that $Fe^{3+}$and Sr^{2+} mutually diffuse through the crystal lattice of O^{2-}, especially Sr^{2+}diffusion is primary, the solid reaction for the appearance of strontium ferrite take places in the interfaces of Sr $Fe_{12}O_{19}$- $Fe_2O_3$and SrO-Sr $Fe_{12}O_{19}$respectively.

Key words:superpure iron concentrate; strontium ferrite; defect chemistry; sintering dynamics