

研究论文

Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub>复合粉末还原过程中的微观组织结构

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摘要:

观测Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>和Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub>粉末H<sub>2</sub>还原后的微结构特征,研究了其微观组织结构的演变。结果表明:Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>还原后转变为20 nm厚的Fe薄层包覆Mo颗粒的微结构;Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub>粉末被还原后转变为两种结构形式颗粒粉末,一种为3--5 nm的薄层Fe包覆在Mo颗粒表面粉末,一种为粘附有纳米Fe--Mo氮化物、Si、Mo等颗粒的Si<sub>3</sub>N<sub>4</sub>粉末。Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub>粉末还原后形成这种微结构的原因是,在还原过程中同时发生了两种反应:一种是Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>自身发生分解还原反应,另一种是Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>与Si<sub>3</sub>N<sub>4</sub>颗粒表面发生反应。

关键词: 无机非金属材料 Si<sub>3</sub>N<sub>4</sub> Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub> 微结构 非均相沉淀--热还原

Formation Mechanism of Microstructure of Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub> Composite Powder by Hydrogen Reduction

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Abstract:

The microstructure characterization of Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub> and Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub> composite powder reduced by hydrogen were investigated, and the formation mechanism of the latter was analyzed. The results show that the microstructure of Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub> powder particles reduced by hydrogen was consisted by Mo particles coated with thin layer of Fe with thickness around 20 nm. The microstructure of the other were two kinds of particles with different structure which were consisted by Mo particles coated with nanometer-thin layers of Fe with thickness about 3--5 nm and nano Fe--Mo nitride, Si and Mo as adhesive materials on Si<sub>3</sub>N<sub>4</sub> particles surface. The formation reason of the microstructure of Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub> composite powder reduced by hydrogen powder was two reactions during the reduction process. One is the decomposition-reduction reaction of Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>, the other is the reaction between the surface of Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub> and Si<sub>3</sub>N<sub>4</sub>.

Keywords:

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- 微结构
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