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溶胶–喷雾干燥W-Cu前驱体粉末煅烧过程中的相变

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摘 要： 采用溶胶–喷雾干燥法制备不同铜含量的W-Cu前驱体粉末，前驱体粉末分别在400、600和800 ℃各煅烧90 min，运用XRD和SEM等手段对煅烧前后复合粉末的相组成和显微形貌进行分析，研究前驱体粉末在煅烧过程中的相变行为。结果表明：前驱体粉末在煅烧过程中发生一系列的分解和化合反应，随着煅烧温度的升高，粉末的相组成、颗粒形貌和尺寸发生明显变化，对W-30%Cu(质量分数)合金，在400 ℃煅烧后，复合粉末由WO_3、CuO和$CuWO_4$组成，粉末颗粒大多呈立方结构，大小为200~400 nm；在600 ℃煅烧后，复合粉末由CuO和$CuWO_4$组成，粉末颗粒大多呈短棒状结构，大小为400~500 nm；在800 ℃煅烧后，复合粉末由CuO、$CuWO_4$和Cu_3WO_6组成，粉末颗粒大小为3~4 μm；前驱体粉末中铜含量对煅烧后复合粉末的相组成也存在较大影响，铜含量越多，越容易生成复合氧化物。

关键字： W-Cu；$CuWO_4$；Cu_3WO_6；高温煅烧；相变；溶胶–喷雾干燥

Phase transformation of sol-spray dried W-Cu precursor powder during calcining

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Abstract: W-Cu precursor powders with different copper contents were fabricated by sol-spray drying. Precursor powders were calcined at 400, 600 and 800 ℃ for 90 min, respectively. Phases and microstructure of pre-calcined and post-calcined powders were investigated by XRD and SEM in order to study the phase transformation of precursor powders. The results show that precursor powders undertake a series of decomposing and compounding reactions during calcining. With the increasing of calcining temperature, the phases, morphology as well as particle size of the powder change obviously. For W-30%Cu (mass fraction) composite powder, the composite powder is composed of WO_3, CuO and $CuWO_4$ after calcining at 400 ℃ and the particles exhibit cubic shape with sizes of 200−400 nm. The powder after calcining at 600 ℃ consists of CuO and $CuWO_4$ and the particles are mostly of rod-like shape of 400−500 nm in size. The powder after calcining at 800 ℃ is composed of CuO, $CuWO_4$ and Cu_3WO_6 phases and the particles are 3−4 μm in size. The

copper content in the precursor powder greatly influence the phase composition of the calcined powders. The increase of copper content facilitates the formation of composite oxide.

Key words: W-Cu; $CuWO_4$; Cu_3WO_6; high temperature calcine; phase transformation; sol-spray drying