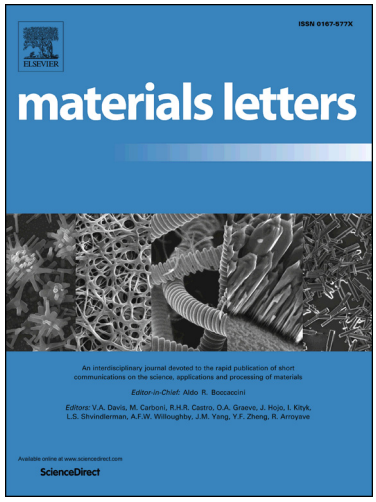

A novel and facile route for synthesis of fine tricalcium silicate powders

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A novel and facile route for synthesis of fine tricalcium silicate powders

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Abstract: Tricalcium silicate (C_3S) powders were successfully prepared via a novel and facile wet-chemical route with CaC_2O_4 and $Si(OC_2H_5)_4$ (TEOS) as raw materials. Pure C_3S powders with small particle size could be synthesized at 1400 °C for 6h. The effects of sintering temperatures on the particle size distribution of C_3S powders were also investigated. The results revealed that the mean particle sizes of different sintered C_3S powders were 2.11, 2.23, 2.92 and 4.01 μm at sintering temperatures of 1300 °C, 1350 °C, 1400 °C and 1450 °C, with the specific surface areas of 2850, 2700, 2060 and 1500 m^2/kg, respectively. The results indicated that the variations of sintering temperature had a great influence on the particle size: higher temperatures improve diffusion of ions to the interstitial sites and therefore a faster grain growth.

Keywords: Tricalcium silicate; Particle size distribution; Sintering; Crystal growth; Wet-chemical route.

1. Introduction

Tricalcium silicate (C_3S) is extremely important clinker phase in Portland cement which is one of the most ancient building materials commonly used by mankind. Recently, pure C_3S has attracted even more attention as bone substitute materials and dental materials due to its sufficient physical properties, excellent biocompatibility and bioactivity [1,2]. Moreover, it has been generally accepted