



Fabricating Luminescent Ceramics Derived from Mesoporous Powders by Spark Plasma Sintering

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ABSTRACT

Due to the attractive properties as excellent thermal and chemical resistance, high visible light transparency, and high thermal diffusion coefficient, transparent ceramic is probably an ideal matrix of luminescent materials. By introducing different lighting dopants, the luminescent ceramics with different properties have been widely used. However, the high temperature required to prepare transparent ceramic by conventional methods could be as high as 1873 to 2573K, which is an obstacle for controllable synthesis and well protection of the embedded materials. Thus, the preparation technologies of the luminescent ceramics are facing new challenges because of these volatile and unstable lighting dopants that are easy to be decomposed. This report introduces a novel, facile route for the preparation of stable monolithic ceramic-based luminescent materials, which can be widely used to introduce temperature-sensitive functional materials into the transparent matrix, by Spark Plasma Sintering (SPS). Furthermore, the research progress and superiority of SPS technology used to develop the light-emitting ceramics containing nanocrystals, perovskite, and phosphors. Owing to the fast sintering procedure of SPS with relatively low temperature, the size, shape, surface topography, and optical properties of the dopants in luminescent ceramics are found to be similar to those of untreated counterparts, which means that the sensitive dopants can be completely protected.

Keywords: Luminescent ceramics; low temperature sintering; mesoporous powders