

Nanosized particle synthesis by Flash Boiling Atomization

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Abstract

An innovative nanosized metal particle synthesis method by flash boiling atomization is proposed. Methane-oxygen premixed flame is utilized as the heat source and the precursor water solution is sprayed into the low-pressure field. Then, droplets are secondary-atomized by flash boiling phenomenon. The zinc acetate water solution is used as the precursor to synthesize ZnO nanosized metal particles. From the view point of industrial aspects, the size controllability of nanosized metal particle, the inhibition of agglomeration and the inexpensive large production quantity are required for the particle synthesis method. The synthesis method, which is presented in this paper, is expected to achieve the above-mentioned characteristics. In this paper, firstly, the flashing spray is observed by using Mie scattering method. Secondly, ZnO nanosized metal particles are synthesized to investigate the effect of the flash boiling atomization on the synthesized particles. It was found that the droplets were well atomized and dispersed when the flash boiling phenomenon occurred. In addition, the higher the temperature of precursor solution became (above the saturated temperature), the smaller the synthesized particles were.

Key words: Nanosized particle, Spray pyrolysis, Flame assisted spray pyrolysis, Zinc oxide, Flash boiling atomization, Gas phase synthesis

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