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An experimental investigation of combustionsynthesis of Sio_2 nanoparticles using theinward typepremixed flame burner

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Silica (SiO_2) nanoparticles are used as additives in plastics and rubbers to improve mechanical properties of elastomers, and in liquid system to improve the suspension behavior. In these applications, the particle morphology, average size, size distribution, and phase composition are considered as the key characteristics of powders that must be controlled.

Flame synthesis is widely used for the production of nanoparticles, as it readily offers the high temperature and oxidizing environment necessary for the growth of such particles. The combustion synthesis is an attractive technique, where particle size, and phase purity can be precisely controlled, along with the potential scale up for high throughput production, giving it an advantage over other methods such as wet chemical and chemical vapor deposition.

The objective of this experimental research was to investigate the synthesis of silicon dioxide nanoparticles using the inward type premixed burner effective to mass production of nanoparticles. In this study, the inward surface premixed flame was examined using a porous baffle plate and alloy metal foam. The results show that the surface and stable premixed flame can be generated by implementing the proper baffle plate and alloy metal foam. The inward surface premixed flame mode is changed into radiation flame, blue flame and lift off flame with decreasing equivalence ratio. The blue flame has a wide stability region and showed the lowest CO and NOx emission at low equivalence ratio. Through preliminary study usingflat premixed flame burnerit is found for silicon dioxide(SiO_2) nanoparticlesto be generated using silane(SiH_4) as precursor. And surface premixed blue flame was retained to be very stable under precursor inlet velocity and silane concentration for synthesis of silicon dioxide nanoparticles.

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