| DSM Science & Technology Awards (SOUTH) 2009 | |
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Nanostructured particles such as carbon blacks, silica, alumina and titania are made for over a century on an industrial scale in gaseous flame reactors at several tons per hour. These particles are commonly coated by inorganic or organic materials in wet-phase processes to condition their surface for their easier dispersion in liquid suspensions (inks, paints) or polymer nanocomposites (tires, toothpaste, summer furniture). The particle synthesis and surface coating are two distinct processes, requiring two separate plants. In this work, a new gas-phase process was developed for synthesis and coating of flame-made nanoparticles in one-step. The process was applied for the $SiO_2$-coating of photocatalytically active $TiO_2$ and superparamagnetic $Fe_2O_3$ nanoparticles, but was also extended to organic coatings. In the context of developing the next generation of flame-made materials beyond the traditionally synthesized ones, this is a decisive contribution that impacts the simple and cheap process development of new sophisticated nanomaterials.