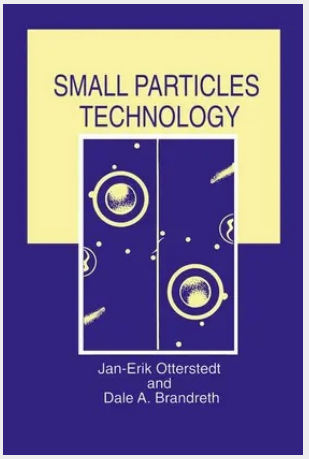
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Small Particles Technology



It is difficult to imagine modem technology without small particles, 1-1000 nm in size, because virtually every industry depends in some way on the use of such materials. Catalysts, printing inks, paper, dyes and pigments, many medicinal products, adsorbents, thickening agents, some adhesives, clays, and hundreds of other diverse products are based on or involve small particles in a very fundamental way. In some cases finely divided materials occur naturally or are merely a convenient form for using a material. In most cases small particles play a special role in technology because in effect they constitute a different state of matter because of the basic fact that the surface of a material is different from the interior by virtue of the unsaturated bonding interactions of the outermost layers of atoms at the surface of a solid. Whereas in a macroscale particle these differences are often insignificant, as the 9 surface area per unit mass becomes larger by a factor of as much as 10, physical and chemical effects such as adsorption become so pronounced as to make the finely divided form of the bulk material into essentially a different material usually one that has no macroscale counterpart.

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