Fillers

Subjects: Polymer Science

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Fillers are solid particles added to a polymer to reduce cost, to change a physical property, or to give the compound a colour. The classical fillers are cheap minerals, calcium carbonate and talc among them, whose role is to replace part of the more expensive resin [1]. When the particle is much stiffer than the matrix and the interface transmits load, the filler also raises the modulus, and the effect increases with the aspect ratio of the particle [2]. Aggregation is the main problem, because a poorly dispersed filler acts as a defect rather than as a reinforcement, and the surface is therefore treated with a coupling agent [3]. Thermally conductive and electrically conductive fillers require a connected network, so they are added at a loading above the percolation threshold, which usually embrittles the compound [4]. Predicting the property of a filled system from the filler content and shape is still only approximate once the loading exceeds a few percent [5].

particulate reinforcement | aspect ratio | coupling agent | percolation threshold | dispersion | calcium carbonate | filler loading

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