

Title

Physical properties of PBT resin compounded with inorganic filler (Mica, Talc, GF)

Category

Plastics

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<Abstract>

For the purpose of improving the physical properties of plastics, we added various inorganic fillers. In this trial, various inorganic fillers were mixed in PBT, and resin physical properties were measured.

Mica and GF (glass fiber) have higher flexural modulus than others. However, GF is a fibrous filler and has large anisotropy of mold shrinkage, while strength is greatly improved. But mica is a flake-like filler and has small isotropically molding shrinkage. We can say that Mica is suitable filler if its targeting with high-rigidity and low warpage.

<Implementations>

For test piece of measuring physical properties, various inorganic fillers (30wt%) were mixed in PBT resin by dry blending method, then made compound pallets with a single screw extruder.

<Results>

Table 1. Physical properties of PBT with inorganic filler

Type of filler	Flexural Modulus (GPa)	Flexural strength (MPa)	Charpy Impact strength (kJ/m ²)	Heat deflection temperature (°C)	Mold shrinkage ratio (*1)	
					MD (%)	TD (%)
No blended	2.3	83	2.3	73	2.22	2.16
Mica	8.7	134	2.1	166	0.82	0.81
GF (glass fiber)	8.8	221	10.5	206	0.51	1.23
Talc	5.5	90	2.1	143	—	—
Kaolin	4.5	104	2.7	113	—	—
Wollastonite	6.9	112	2.2	170	—	—

※Data acquisition date: Sep, 2007(*1: Jul, 2005)

- Mixing with various inorganic fillers, we could see flexural modulus, flexural strength and heat deflection temperature were increased.
- Compared to others, the flexural modulus of mica and GF were improved.
- In comparison with other fillers, GF improved flexural strength, CHARPY impact strength, and heat deflection temperature.
- In molding shrinkage, the difference between MD(in the molding flow direction) and TD(in the flow perpendicular direction) was large in GF. But for Mica, it was isotropically and small.

<Conclusions>

It is possible to improve specific physical properties by mixing various inorganic fillers, but the impact is different depending on the type of filler. GF is excellent in rigidity and strength improvement, but it is fibrous filler with large anisotropy of molding shrinkage. By contrast with it, mica is an isotropic plate-like filler and small molding shrinkage.

The molding shrinkage rate is related to the shape of filler. So, mica is suitable filler if its targeting with high-rigidity and low warpage.

In resin market, different fillers are often mixed together such as “GF + mica” and “GF + talc” for well balancing of rigidity, strength and moldability.