Thermal Conductive MgO Filler

RF series

MgO as the Radiation Filler



Ube Material Industries,Ltd.

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RF series

Thermal conductive filler is a filler that is filled to give the resin heat dissipation. Until now, MgO has been avoided as a thermal conductive filler due to its high hygroscopicity. The RF Series has greatly improved water resistance by high-temperature sintering(1800~2000℃) and unique reaction conditions. As a comprehensive manufacturer of MgO, we are able to provide stable supply through integrated production from raw materials. We deliver the thermally conductive filler MgO, which has high thermal conductivity and high insulation, at a low cost.

Characteristics

Filler	Thermal conductivity (W/m・K)	Specific resistance (Ω・cm)	Hardness (Mohs' hardness)
Magnesia	42~60	1×10^{17}	6
Alumina	26~36	1×10^{15}	12
Hexagonal boron nitride	31~60	1×10^{14}	2
Aluminum nitride	180~270	$>1\times10^{14}$	8

＊ These figures refer to technical books published by Technology Information Institute Co., Ltd. in Japan and refer to public information on web site.

High thermal conductivity

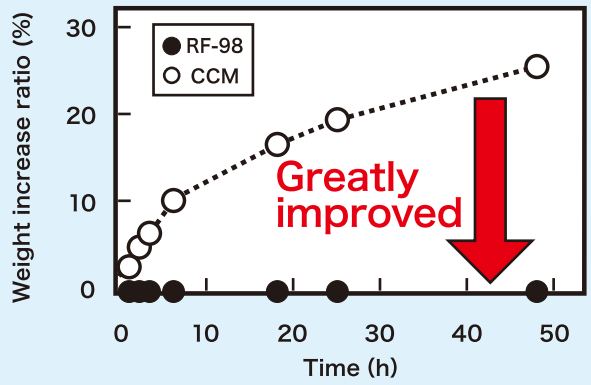
Among highly safe and inexpensive oxides, MgO boasts the highest thermal conductivity. Therefore, the thermal conductivity can be improved by partially replacing fillers (such as alumina) already in use. MgO has high resistivity, so it can also be used as an insulating material.

Low hardness

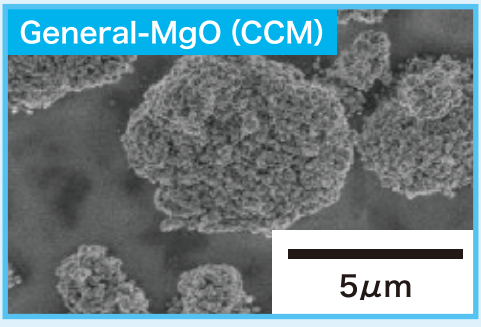
By producing resin compounds filled with MgO, wear on the screw of the kneader, etc. can be reduced. It can also reduce costs by extending process life, for example, by reducing wear on injection molds.

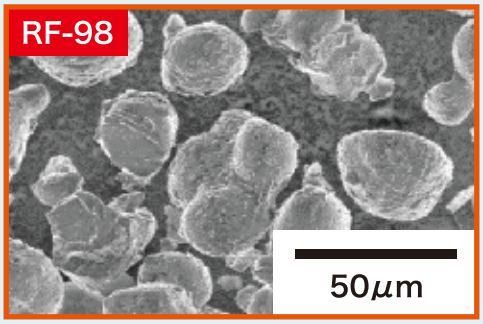
Water resistance

General-MgO (CCM) is highly reactive, and when exposed to moisture, the hydration reaction causes volume expansion and deformation, resulting in the generation of voids in the resin composition.
Therefore, the application range of MgO has been limited until now because it leads to resin deterioration.
We have greatly improved water resistance of MgO by using high-temperature sintering and unique reaction conditions.(See figure below.)

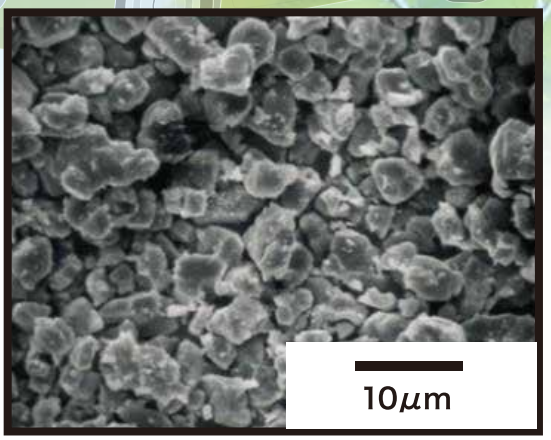


※Moisture absorption resistance (90°C×90%RH)

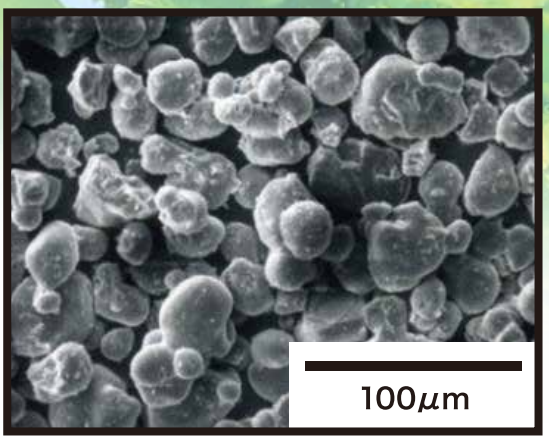




~ Example of SEM images ~



RF-10C Series
(Median diameter 10μm)



RF-50 Series
(Median diameter 50μm)

Product Data Sheet

Product Series Name	Product Name	Coupling agent	MgO (wt%)	Al_2O_3 (wt%)	Fe_2O_3 (wt%)	Median diameter (μm)	Maximum diameter (μm)	Loss on ignition (wt%)	Moisture absorption (wt%)
RFA-100 Series	RFA-100	N/A	≧ 97	≦ 0.15	≦ 0.15	70~120	≦ 600	≦ 0.15	≦ 0.5
	RFA-100-SC -FC -AC	(Vinyl) (Phenyl) (Amino)						—	≦ 0.5
RF-70C Series	RF-70C	N/A	≧ 98	≦ 0.10	≦ 0.10	70~110	≦ 300	≦ 0.5	≦ 5.0
	RF-70C-SC	(Vinyl)						—	≦ 0.5
RF-50 Series	RF-98	N/A	≧ 97	≦ 0.15	≦ 0.15	40~70	≦ 300	≦ 0.15	≦ 0.5
	RF-50-SC -FC -AC	(Vinyl) (Phenyl) (Amino)						—	≦ 0.3
RF-10C Series	RF-10C-45μ	N/A	≧ 98	≦ 0.10	≦ 0.10	7~15	≦ 100	≦ 0.5	≦ 5.0
	RF-10C-SC -45μ -FC -45μ -AC -45μ	(Vinyl) (Phenyl) (Amino)						—	≦ 0.5
RF-10CS Series	RF-10CS	N/A	≧ 98	≦ 0.10	≦ 0.10	4~10	≦ 45	≦ 0.5	≦ 10
	RF-10CS-SC -FC -AC	(Vinyl) (Phenyl) (Amino)						—	≦ 0.5

Effects of surface treatment

①The hydration reaction is suppressed by making the MgO surface hydrophobic.
②Improves wettability and adhesion to resin.

■Usage examples

Coupling agent	Resins
SC (Vinyl silane)	PPS, LCP, PBT, PMMA, Epoxy, Silicone, etc.
FC (Phenyl silane)	Silicone, Epoxy (Imidazol indurating), etc.
AC (Amino silane)	PA6, PA66, Epoxy (Amine indurating), etc.

1) Values are not guaranteed.
2) RF-70C, RF-10C, RF-10CS (Each untreated) have higher moisture absorption ratio than RF-98 and RFA-100, so please handle with it care.
3) Moisture absorption: Rate of weight increase under Temperature 85 ℃-Relative humidity 85 % after 48 hours.



(Contact us)

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