Newly Developed Magnet Powders

Magnets with excellent corrosion resistance

Developed Magnet① Magnetic Properties

Developed material: 18P-A5, P15-A5
Characteristics: Coating of individual magnet powder grains to improve corrosion resistance

Grade	Resin	$(BH)_{max}$ /MGOe	${}_iH_c$ /kOe	B_r /kG	${}_bH_c$ /kOe
Current（18P）	PPS	10.9	16.8	6.9	6.1
18P-A5	PPS	10.8	17.8	6.9	6.2
P15-A5	PPS	11.6	13.3	7.3	6.2

All figures are representative

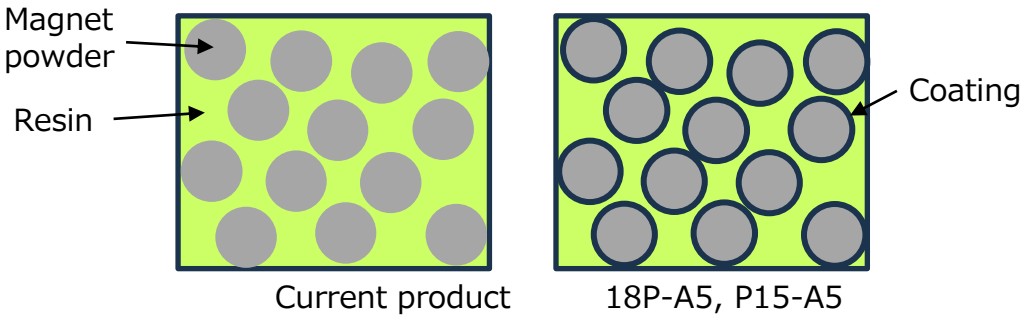
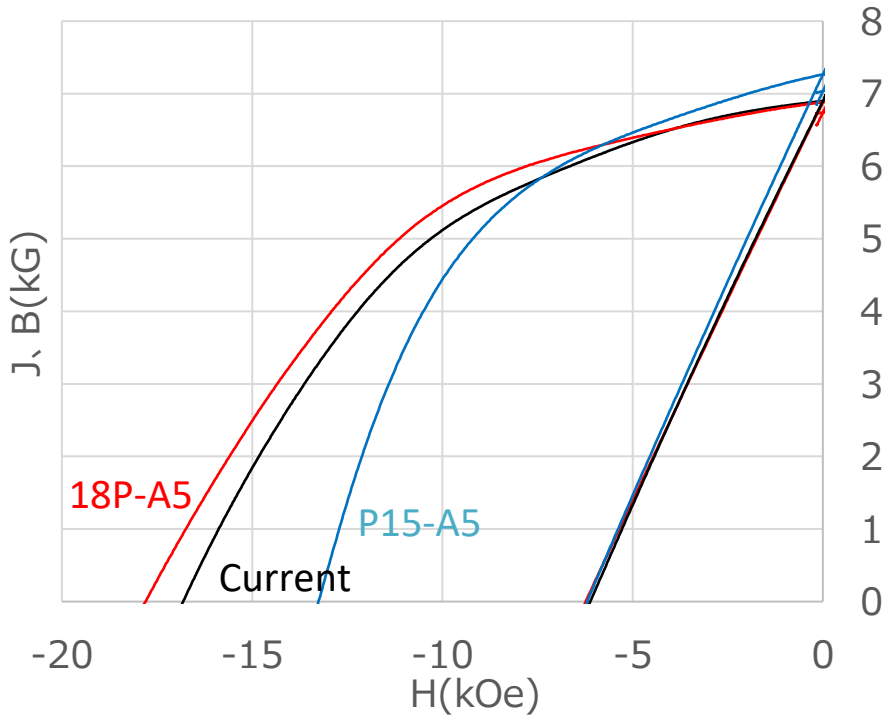
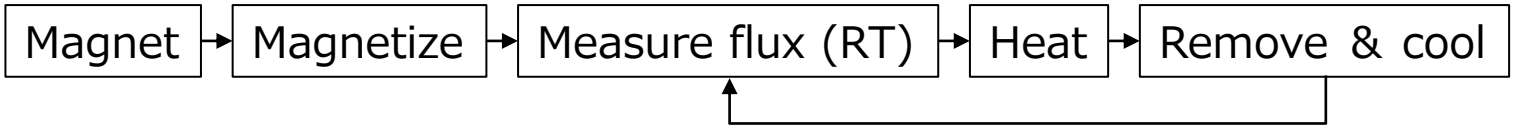


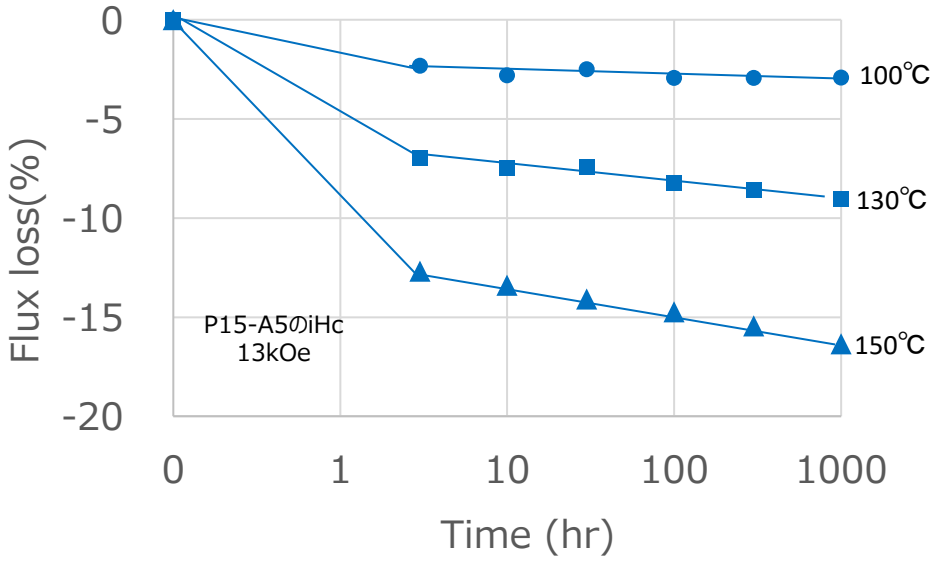
Fig. Bonded magnet

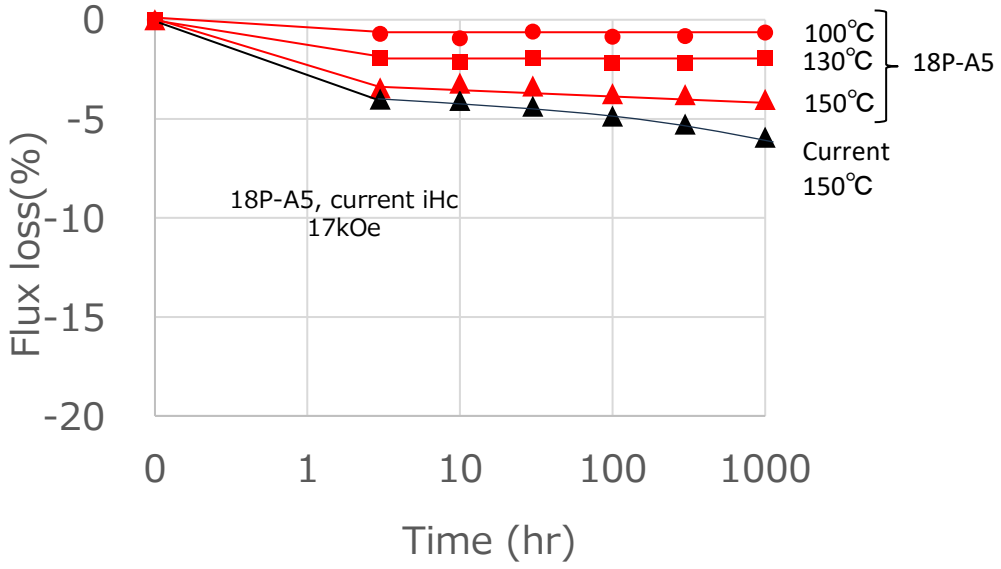


Developed Magnet① Corrosion resistance in air

・Magnet shape: 11mm cube
・Atmosphere: Air
・Measurement method: Magnetize at room temperature with an air-core coil (4.0T or more), then heat in an oven at a specified temperature under atmospheric pressure. After heating for a certain period of time, remove the magnet, cool it to room temperature, and measure the flux.



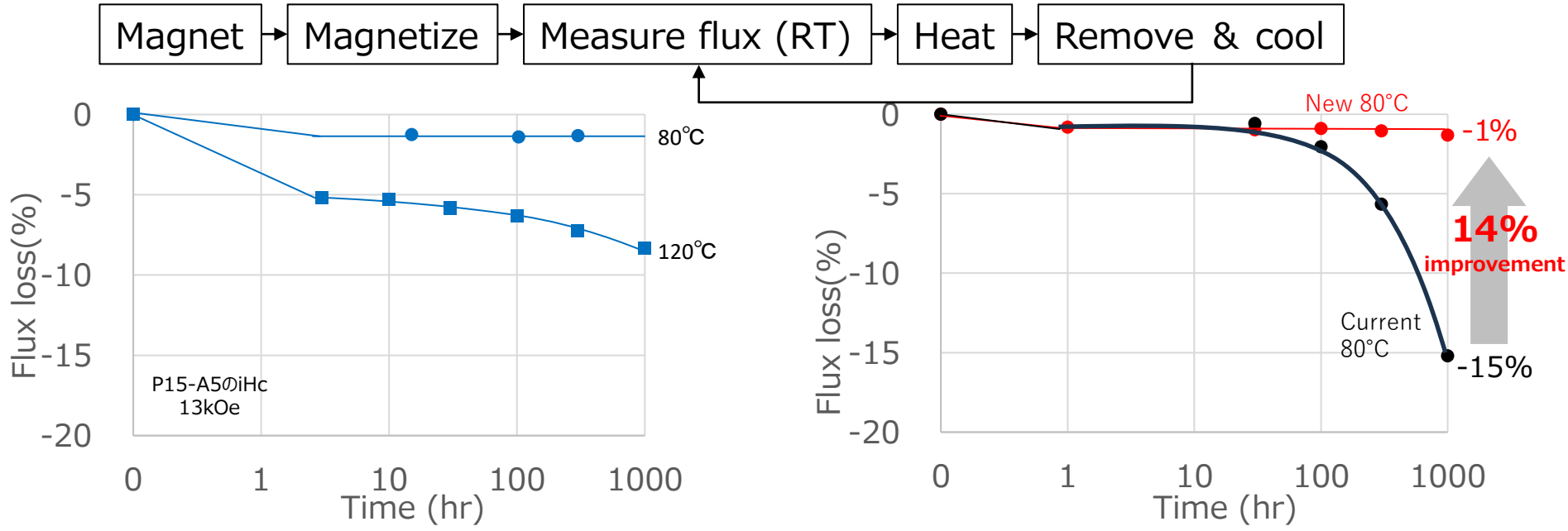




The developed material has a linear flux loss versus time (our conventional materials have a curved flux loss).

Developed magnet① Durability in aqueous solution

・Magnet shape: 11mm cube
・Atmosphere: 50% LLC aq ＊LLC: automotive long life coolant
・Measurement method: Magnetize (4.0T or more) at room temperature with an air-core coil, then heat in 50% LLCaq in an oven at specified temperature. After heating for a certain period of time, remove the magnet, cool it to room temperature, and measure the flux.



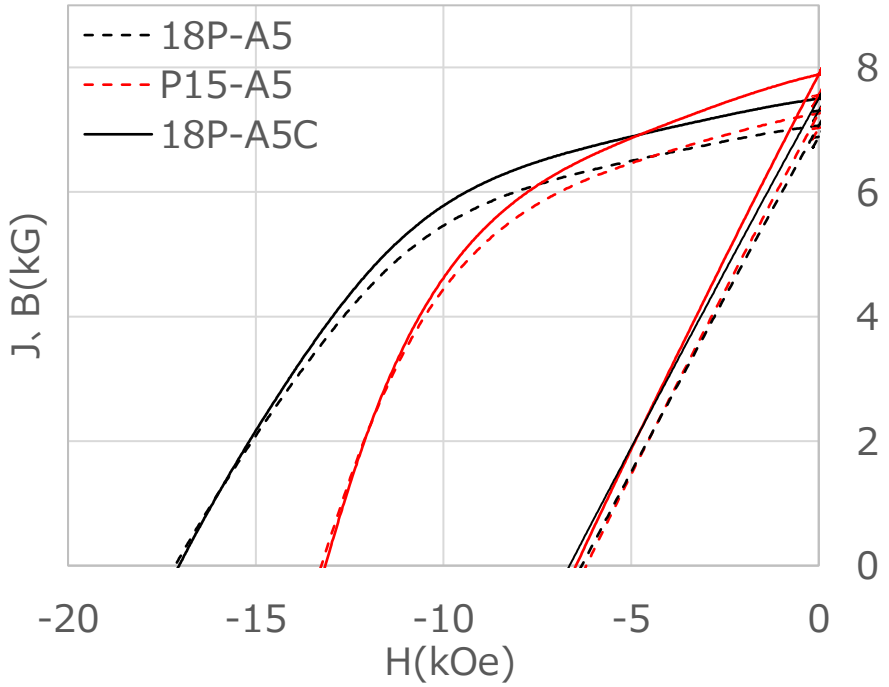
・The developed material significantly improves flux loss compared to our conventional materials.
・Suppressed the degradation during refrigerant testing that was an issue with our conventional materials.

Developed magnet②　Magnetic properties

Developed materials: 18P-A5C, P15-A5C
Characteristics: Compression molded version of the magnet introduced in Developed Magnet①.
The magnetic powder used is the same as that used for the injection molded magnet.

Grade	Mold method	Resin	$(BH)_{max}$ /MGOe	${}_iH_c$ /kOe	B_r /kG	${}_bH_c$ /kOe
18P-A5	Injection	PPS	10.8	17.8	6.8	6.2
P15-A5			11.6	13.3	7.2	6.2
18P-A5C	Compression	Epoxy	12.6	17.0	7.5	6.6
P15-A5C			13.4	13.2	8.0	6.5

All figures are representitive



A5 magnet (PPS) physical properties

Item	Test conditions	Unit	Value
Linear expansion	40-150℃	10^{-6}/℃	19
Density	RT	g/cm^3	4.8
Flexural strength	RT	MPa	64
Young's modulus	RT	GPa	25
	90℃		11
	120℃		6
	150℃		4
Tensile strength	RT	MPa	33
	90℃		33
	120℃		23
	150℃		19
Recoil permeability	-	-	1.05

The values are typical values and not guaranteed values.
The values in the table are almost the same for P15-A5 and 18P-A5.

Reference) Molding and alignment conditions for A5 magnet (PPS)

Recommended molding conditions

- Injection speed: Slower
- Dwell pressure: Lower
- Max pressure: Lower
- Nozzle, die temp: Higher

Applying excessive pressure or load to the magnetic powder can cause a decrease in properties.
→ A decrease in Br due to misalignment, a decrease in durability and corrosion resistance due to peeling of the magnetic powder coating, etc.

For reference, the molding conditions for a cube (11 mm) are shown in the table.

Nozzle temp.	Die temp.	Inj. speed	Dwell pres.	Back pres.
300℃	140℃	30mm/sec	10MPa	10MPa

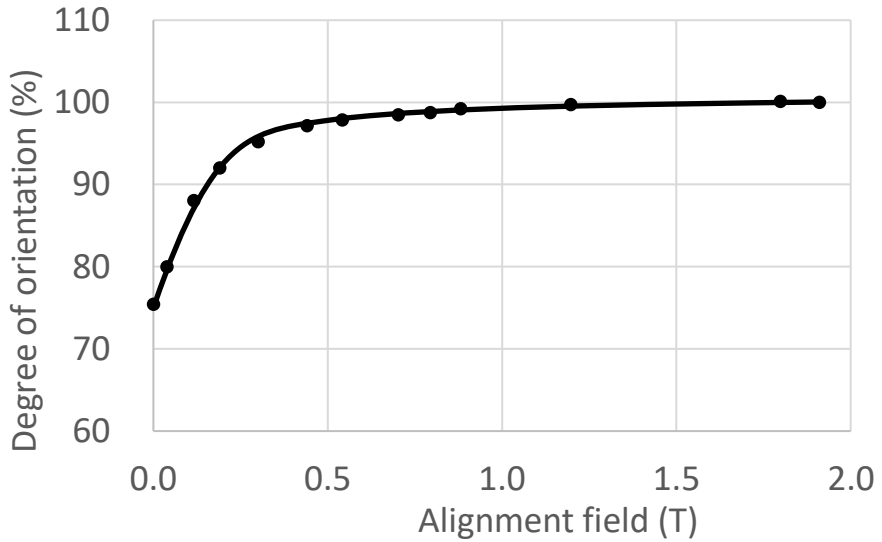


Fig. Relationship between the degree of orientation and applied magnetic field when molding 11mm cube

Reference) A5 magnet powder magnetic properties

- We can also provide magnetic powder to compound manufacturers and molding manufacturers.

This data is the magnetic powder characteristic value.
It is not the magnetic property after molding.
The values in the table are representative values, not guaranteed values.

	Grade	Br(kG)	bHc(kOe)	iHc(kOe)	BHmax(MGOe)	
	P15	13.5	10.0	13.5	41.2	High Br
New	P15-A5	13.2	9.3	13.1	34.1	
	18P	12.6	10.5	17.1	36.8	High iHc
New	18P-A5	12.5	9.9	16.8	32.7