

Surface processing techniques for Nd magnets in Shin-Etsu

Nickel plating



Standard coating for Nd magnet

Epoxy coating



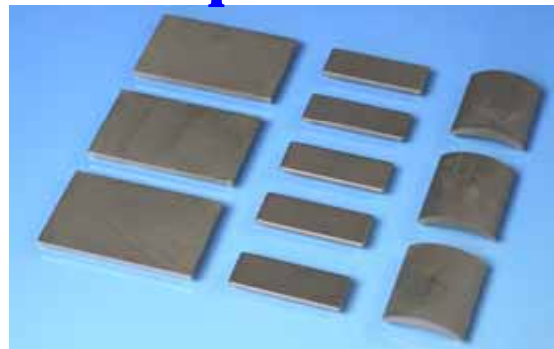
High-corrosion resistance and
befitted large size magnet

Inorganic coating



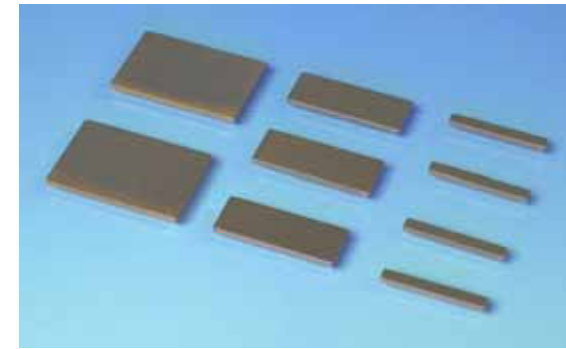
High corrosion resistance,
high salt spray resistance
and high thermal resistance

Aqua coat



Easy processing and
high thermal resistance

RX coat



Oil resistance
for compressor motor

Results of Corrosion Test

Test. 1: Humidity Test (80°C x 90%RH x 1600Hrs)

Test. 2: Pressure Cooker Test (120°C x 100%RH x 500Hrs)

Test. 3: Salt-Soaking Test (5wt%NaCl solution x 35°C x 200Hrs)

Surface treatment Test	Ni Plating	Epoxy Coating	Aluminum Ion Plating
Humidity test	No Changed	No Changed	No Changed
P.C.T	No Changed	No Changed	5pcs rusted
Salt-soaking test	4pcs rusted	No Changed	5pcs rusted

=Note=

Number of samples : 5pcs

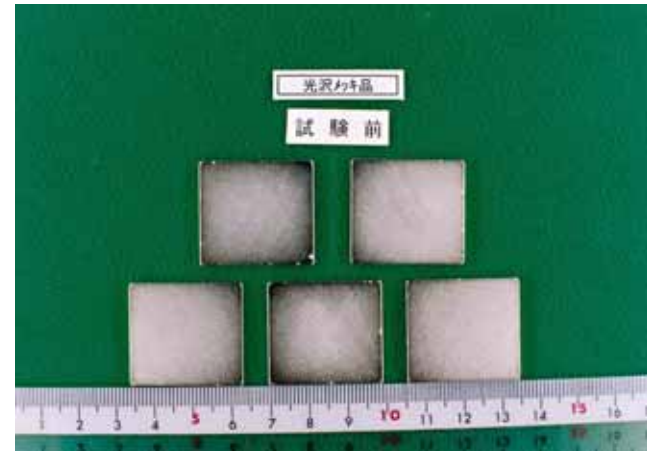
Thickness : Ni Plating = 12 (10 – 15) μm
 Epoxy Coating = 15(10 – 20)μm
 Aluminum Ion Plating = 12μm

Shin-Etsu
 Shin-Etsu
 Another company

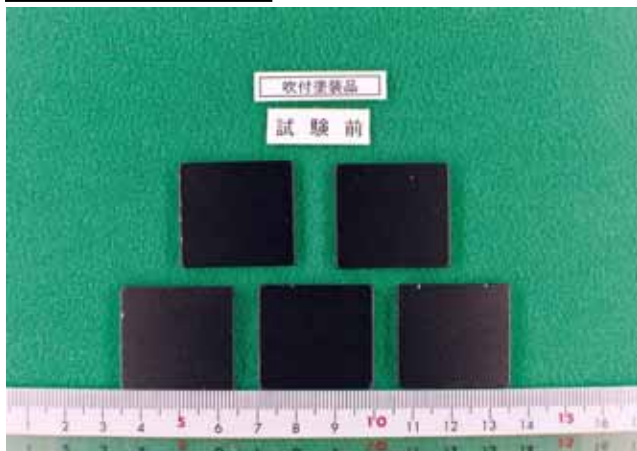
Appearance of each surface treatment

Before the test

Ni plating



Epoxy coating



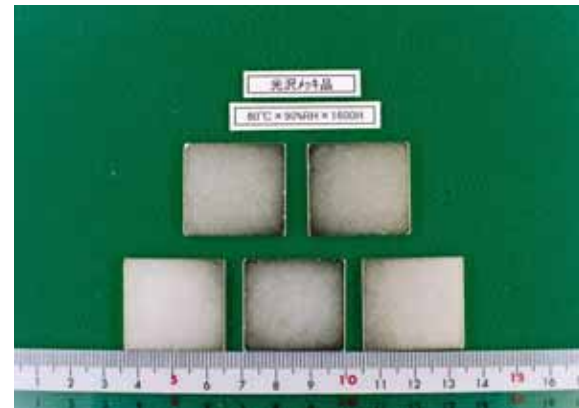
Aluminum Ion Plating



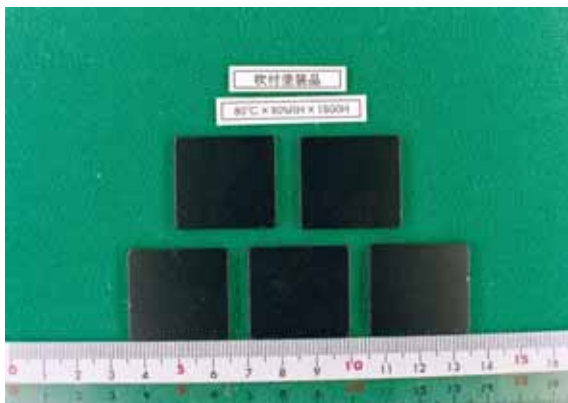
Results of Corrosion Test

**Humidity Test (80°C X 90%)
after 1600hrs**

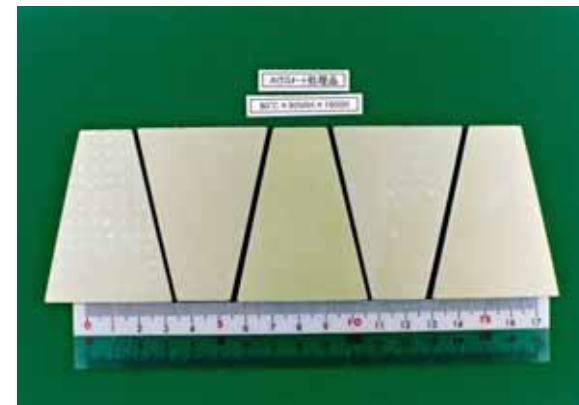
Ni plating



Epoxy coating



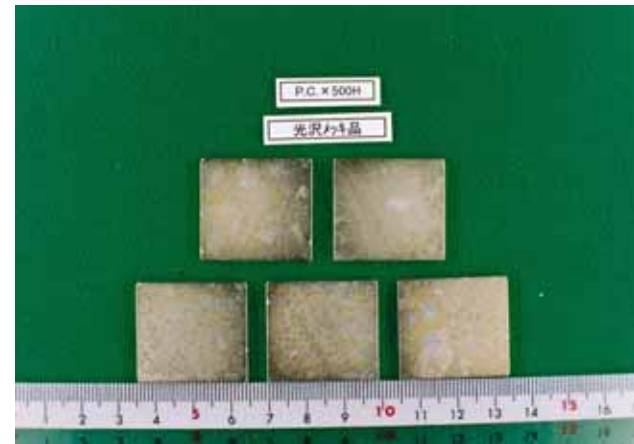
Aluminum Ion Plating



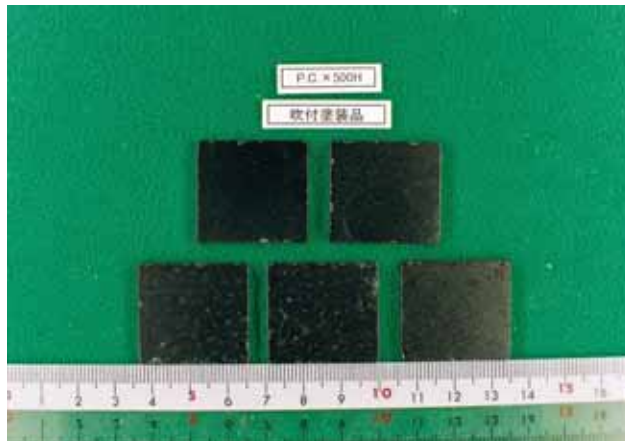
Results of Corrosion Test

**P.C.T(120'C X 100% X 2atm)
after 500hrs**

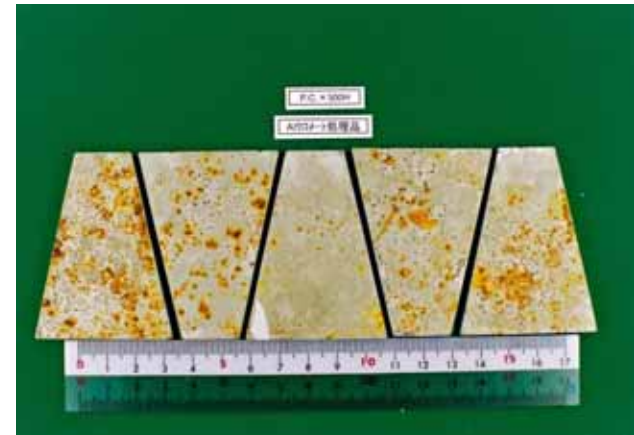
Ni plating



Epoxy coating



Aluminum Ion Plating

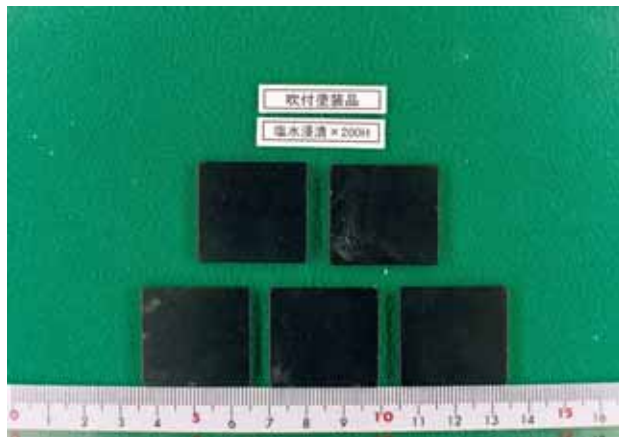


Results of Corrosion Test

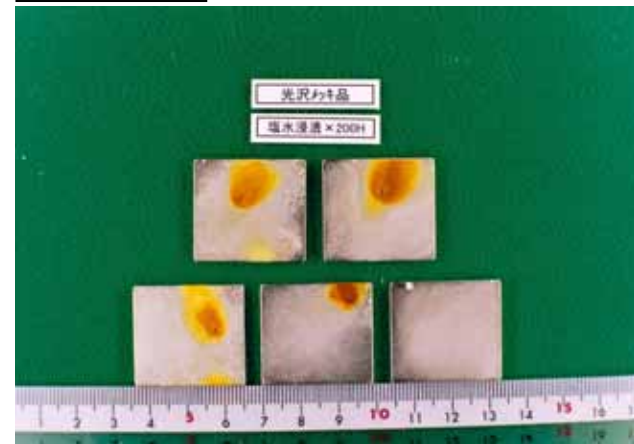
Salt-Soaking Test

(5wt%NaCl solution X 35'C X 200Hrs)
after 500hrs

Epoxy coating



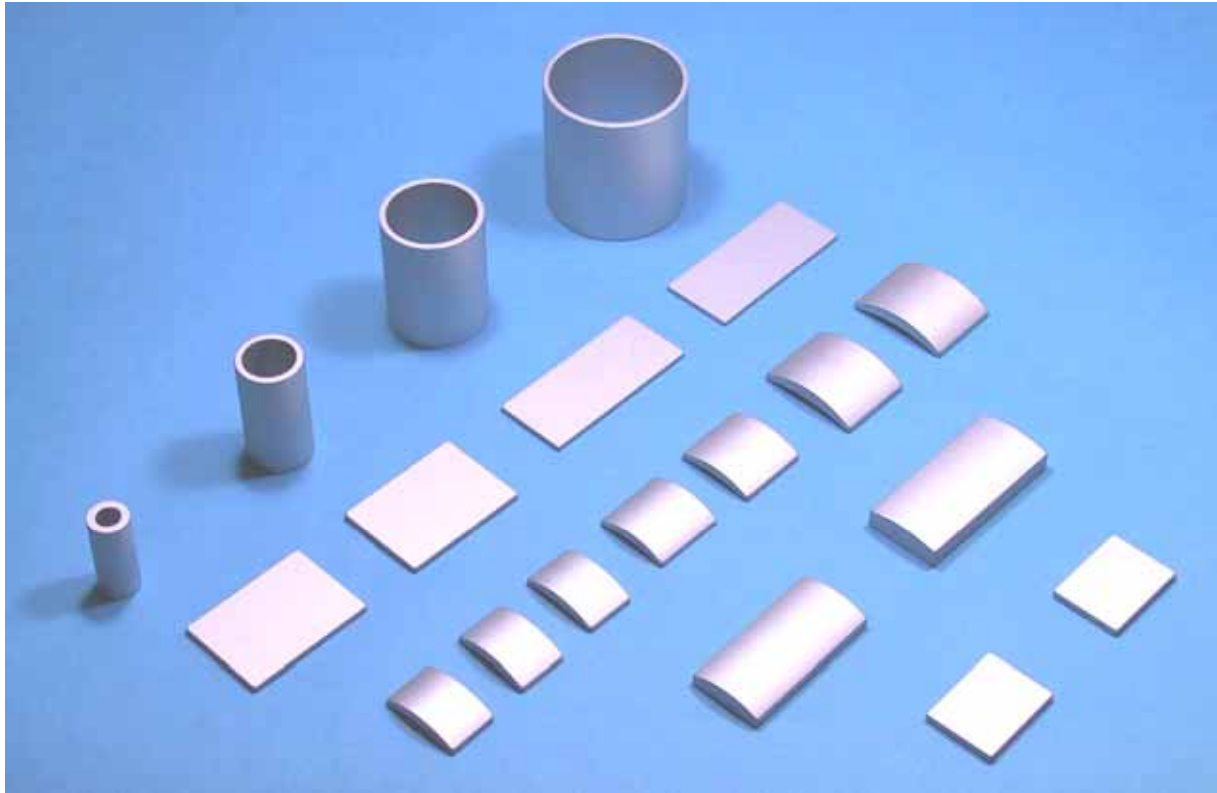
Ni plating



Aluminum Ion Plating



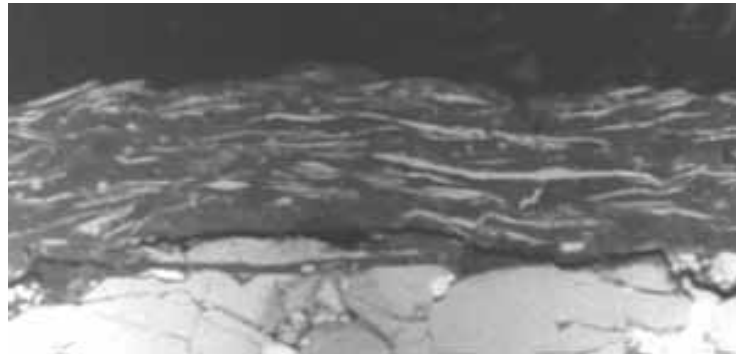
New Surface Treatment for Nd Magnet: Inorganic Coating



1. High corrosion resistance to moisture, salt water, etc.
2. High thermal resistance
3. Free from any toxic substances (Cr, Pb, etc.)

Microscopic View of Cross-section

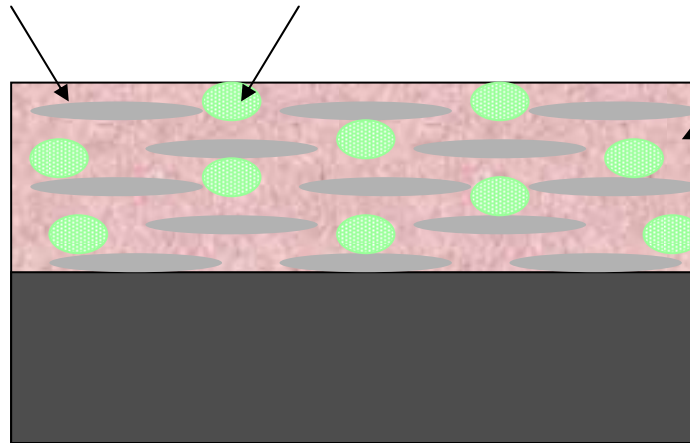
Thickness
~ 10 μ m



Zn flake

Anticorrosive pigment

Binder



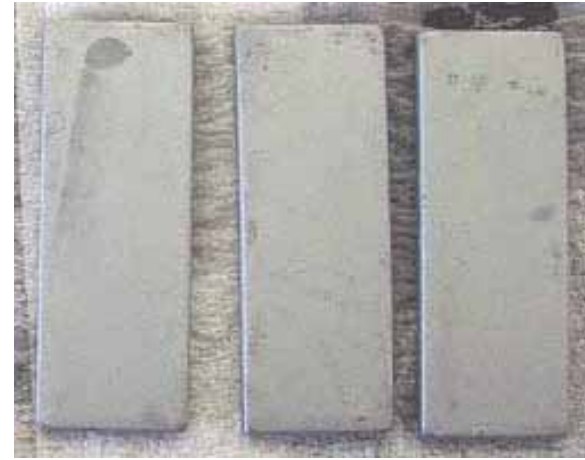
Nd magnet

Salt spray test (JIS Z2371 : 5wt% NaCl solution, 35degrees)

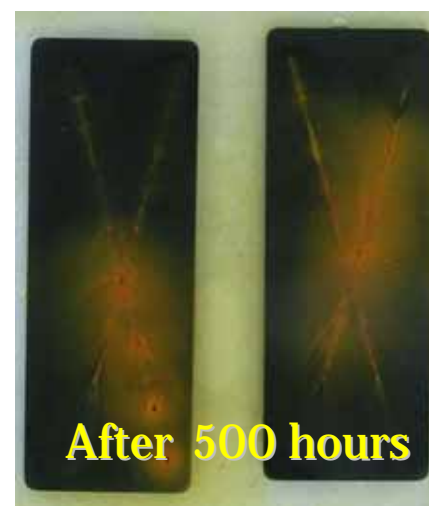
500 hours







1000 hours



Magnet with scratches



Results of various corrosion tests

Salt spray test		1000hours
Salt water immersion test		1000hours
humidity test (80 ,90%)		1000hours
Autoclave test (120 ,2atm)		100hours

 **Inorganic coating is effective for motor applications.**