FUTA-Q Imagination & Innovation

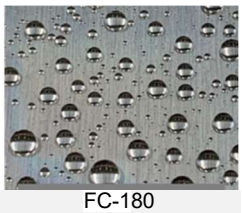
Technical Information

Vol. 34

Chemical Resistant Property of Fluorine Thin-film Coating, FC-180

1. Fluorine thin-film coating, FC-180

FC-180 coating forms a very thin fluorine film less than 1/1000 mm in thickness on a substate surface. This can give products the property of water/oil repellency without ill influencing to the sizes of a critical part such as the inner/outer diameters of a precision nozzle. Due to its superior chemical stability, the coating has also excellent chemical resistance property.

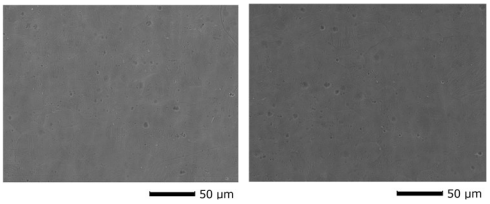


FC-180
water repellent coating

2. The chemical resistance test of FC-180

The chemical resistance test showed the excellent resistance property of FC-180 against an alkaline, an acid, and an organic solution. For stainless steels, however, the test result implies that the coating was insufficient for preventing the substance from eroded by the chemicals. In this case, a thicker coating could lead a better result.

SEM images of the test pieces
(No changes are observed after testing)



The chemical resistance test of FC-180
(The result in practical use will depend on the product shape and the use environment.)

Test pieces (sheet)	Immersion time	15 minutes				30 minutes			
	Solutions	Alkaline		Acid	Organic	Alkaline		Acid	Organic
		0.1 mol/l_NaOHaq (pH≈13)	10%_NaClOaq (pH≈13)	0.1 mol/l_HClaq (pH≈1)	IPA	0.1 mol/l_NaOHaq (pH≈13)	10%_NaClOaq (pH≈13)	0.1 mol/l_HClaq (pH≈1)	IPA
Stainless steel (SUS316L)	Water repellency	NC	NC	NC	NC	NC	NC	NC	NC
	Change in fluorine concentration **	NC	NC	NC	NC	NC	NC	NC	NC
	Changes in visual observation ***	NC	NC	NC	NC	NC	NG *	Poor *	NC
β-taianium	Water repellency	NC	NC	NC	NC	NC	NC	NC	NC
	Change in fluorine concentration **	NC	NC	NC	NC	NC	NC	NC	NC
	Changes in visual observation ***	NC	NC	NC	NC	NC	NC	NC	NC
Memory shape alloy	Water repellency	NC	NC	NC	NC	NC	NC	NC	NC
	Change in fluorine concentration **	NC	NC	NC	NC	NC	NC	NC	NC
	Changes in visual observation ***	NC	NC	NC	NC	NC	NC	NC	NC

NC: no change, **Poor**: several µ meters peeled off in part, **NG**: 10 µms peeled off

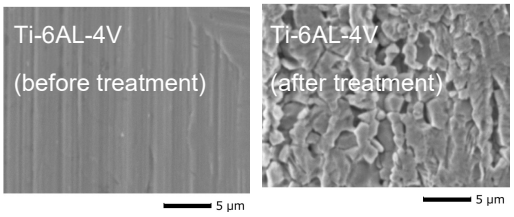
* Presumely erosion by chloride ions.

** Fluorine concentration (atm%) on the surface measured by EDS, which is correlated with the coating film thickness.

*** Observed using SEM (x500).

3. Related technologies

Having a proper surface for the coating is essential for forming a strong coating of FC-180. We are now working on the development of the technology for adjusting surfaces of various kinds of materials. In this process, we have found ourselves to form column-shape oxides on the surface of Ti-6AL-4V. Please contact us if you are interested in this.



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