Overview

Atmospheric Treatment:

Sample treatment in stationary iodine vapor with following conditions:

Name	Iodine partial pressure	Temperatuer	Treatment Duration
10 y	15 Pa	100 °C	30 min
100 y	200 Pa	100 °C*	30 min
1 000 y	2 000 Pa	100 °C*	30 min
10 000 y	6 000 Pa	100 °C	180 min

*for 200020, 200743, 201257, and 1291808 temperature = 50 °C



Sputter Treatment:

The samples were sputtered with iodine and xenon. The acceleration voltage of the ion source was 1500 V. The treatment time was between 30 - 60 min with a measured beam current on the samples of 0.1 - 0.25 mA/cm². The accumulated current over time (mAs) was the same for samples treated by xenon and iodine.
The sputter effect was evaluated by measuring the height difference (sputter edge) between a sputter-protected and a sputtered area with a profilometer. The sputter yield was calculated with the sputter edge under consideration of the density and molar mass of the sample.

A list of the measured sputter edges of all samples with the respective sputter yields (γ) (acceleration voltage 1.5 kV).

Sample	Iodine sputter edge [nm] (γ)	Xenon sputter edge [nm] (γ)
Titanium	715 (1.37)	239 (0.46)
Al-6082	304 (0.60)	1486 (3.11)
Al-7075	275 (0.54)	1314 (2.55)
Al-5754	533 (1.05)	1716 (3.29)
AISI-304	1038 (2.22)	943 (2.20)
AISI-316	1354 (3.94)	1450 (4.29)
4544	471 (2.09)	1367 (6.26)
4546	1004 (2.51)	905 (2.54)
4571	534 (1.53)	1286 (3.82)
4404	537 (1.53)	525 (1.49)
LaB6	318 (0.6)	615 (1.17)
Electride	811 (1.64)	981 (1.99)
Cyanat	3000 (6.41)	6250 (13.20)
G-Epoxy	2068 (7.07)	2481 (7.48)

Plasma Treatment:

The samples were exposed in an electrically floating configuration to an iodine plasma with the following conditions for 6 hours.

Iodine plasma conditions in the RIM-10 during the plasma treatment.

Property	Value
Electron density, n	9.9e16 m^{-3}
I^- - density, nIm	2.8e16 m^{-3}
I^2 – density, nI2	8.2e18 m^{-3}
I – density, nI	2.5e19 m^{-3}
I^+ - density, nIp	7.2e16 m^{-3}
I_2^+ - density nI2p	5.5e16 m^{-3}
Electron temperature, te	3.5e4 eV
Neutral gas temperature, tg	405 K

	Existing sample
x	Conducted analytical method
Analytical Methods:	
XPS	X-Ray Photoelectron Spectroscopy
SEM	Scanning Electron Microscope
IM	Image (optical inspection)
PR	Profilometer Measurement
Ra	Raman Spectroscopy

Sample	Atmospheric Treatment										Sputter Treatment								Plasma	
	10 y		100 y		1000 y			10000 y			Iodine				Xenon				Iodine	
	XPS	IM	XPS	IM	XPS	IM	Ra	XPS	IM	Ra	XPS	SEM	IM	PR	XPS	SEM	IM	PR	XPS	IM
200020				x	x	x	x													
200743				x	x	x	x													
201257				x	x	x	x													
1291808				x	x	x	x													
4404		x				x			x				x	x			x	x		
4544	x	x			x	x		x	x				x	x			x	x		
4546		x				x		x	x				x	x			x	x		
4571		x				x		x	x				x	x			x	x		
AISI304		x				x		x	x		x	x	x	x		x	x	x	x	x
AISI316					x	x		x	x				x	x			x	x		x
Al		x				x		x	x											
Al5754						x		x	x				x	x			x	x		x
Al6082	x	x		x	x	x		x	x		x		x	x			x	x	x	x
Al7075		x				x		x	x			x	x	x		x	x	x		x
Cr								x	x											
Cyanat		x			x	x	x						x	x			x	x	x	x
Electride								x	x	x		x	x	x		x	x	x		
Fe								x	x											
G-Epoxy		x				x		x	x	x			x	x			x	x	x	x
LaB6								x		x			x	x			x	x		
Mo								x	x											
Nb		x				x		x	x											
Ni								x	x											
Ta		x				x		x	x											
Ti	x	x			x	x		x	x		x	x	x	x	x	x	x	x	x	x
W								x	x											