

Nano-coating issues

Non-fingerprint

Dirk Qi

Outline

- **Process**
- Properties
- Defects on the surface
- Experimental
- Recommendations for improvement

Spraying process

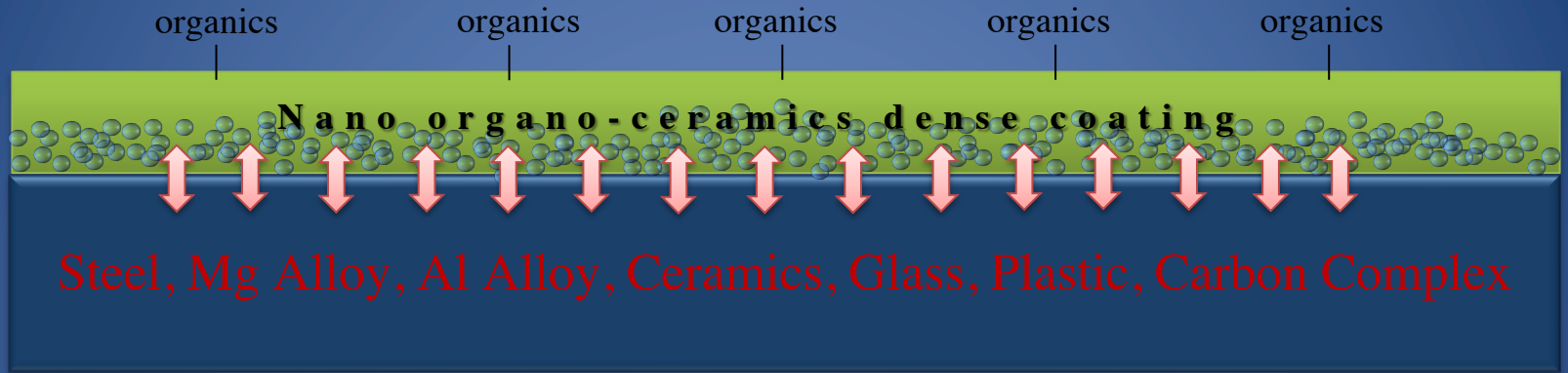
- 1. Check all side views for defects or not from a surface when getting it
- 2. Cleaning the surface
- 3. Spraying the gate value of ISO400
- 4. Observing the surface situation after heat
- 5. Cooling and Holding
- 6. Final inspection and package at all
- 7. Delivery to Htc

Outline

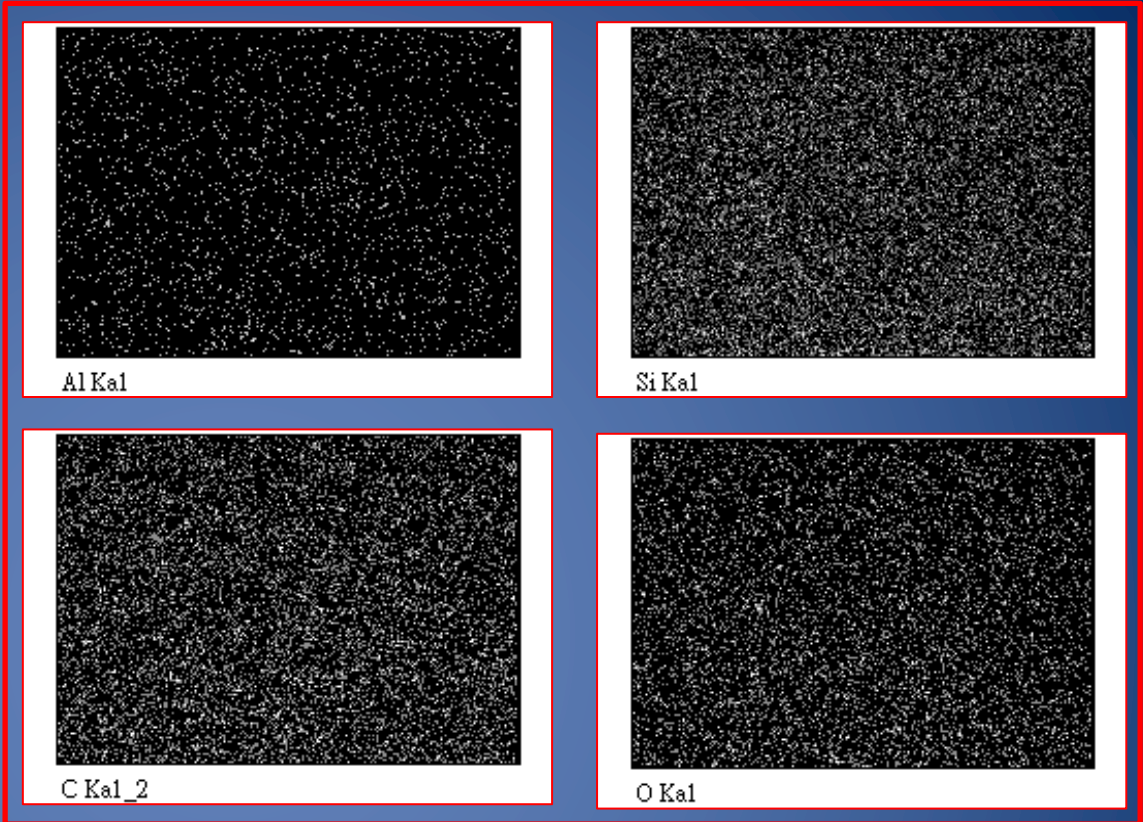
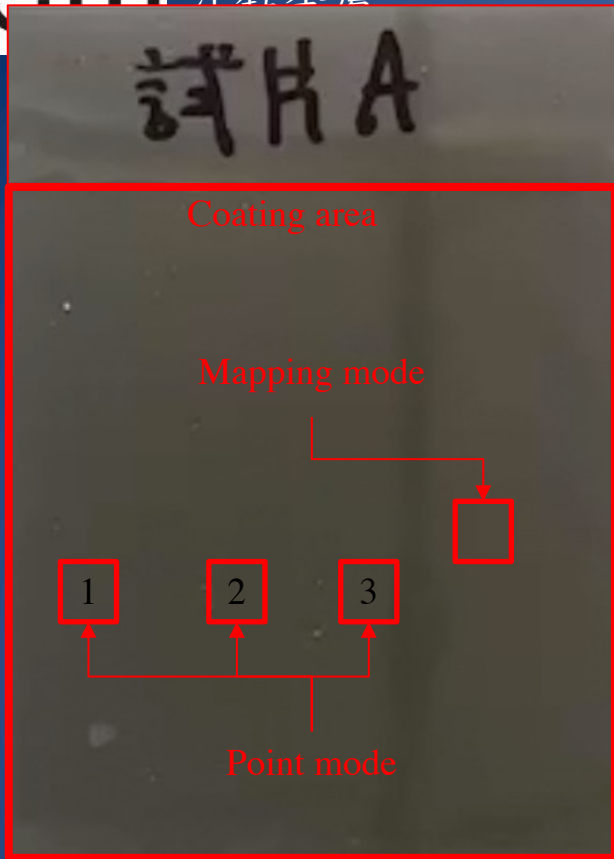
- Process
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Nano-Ceramic resin

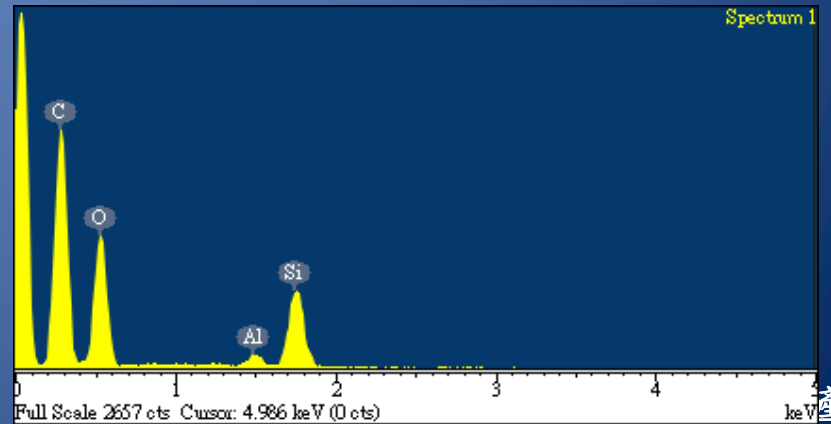
<< Patented >>



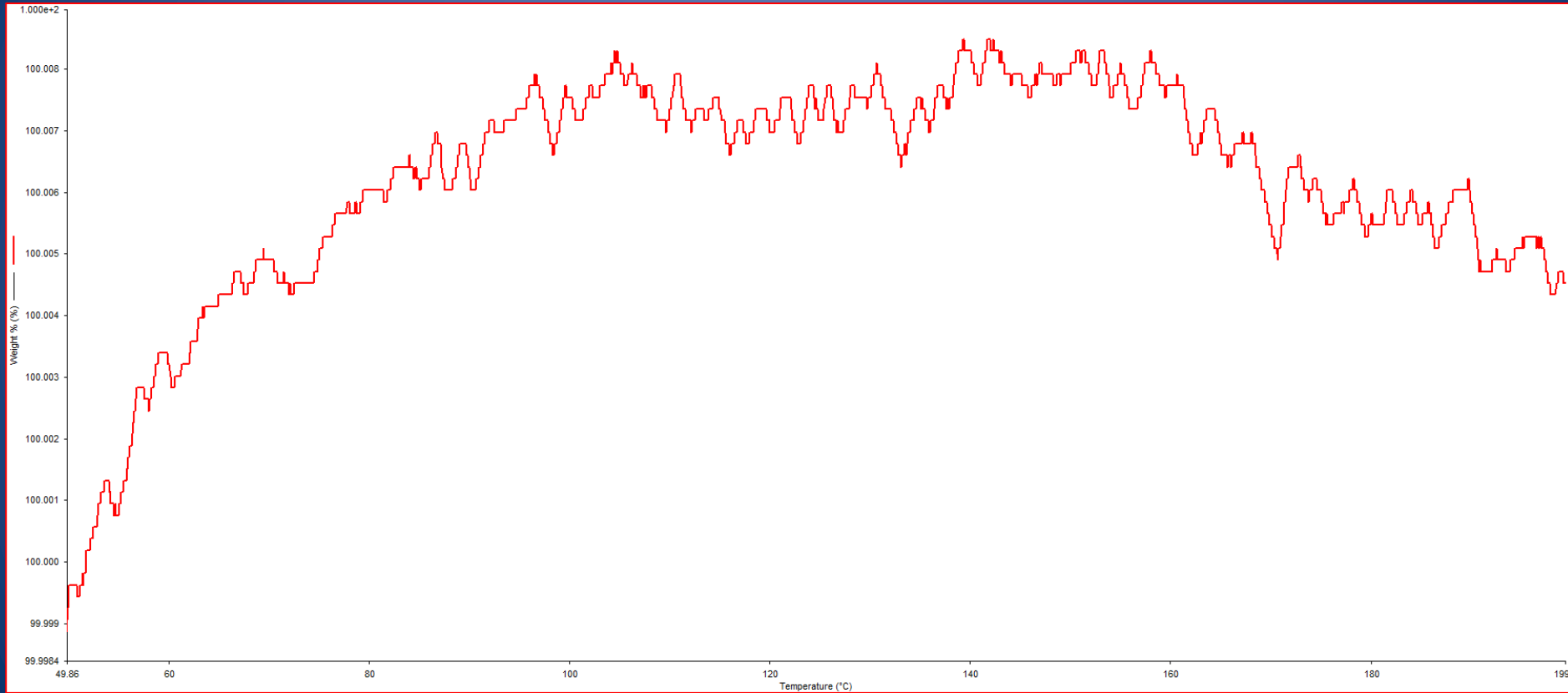
Strong chemical bonding due to the nano-oxides active surface “Tailor-made oxidation”



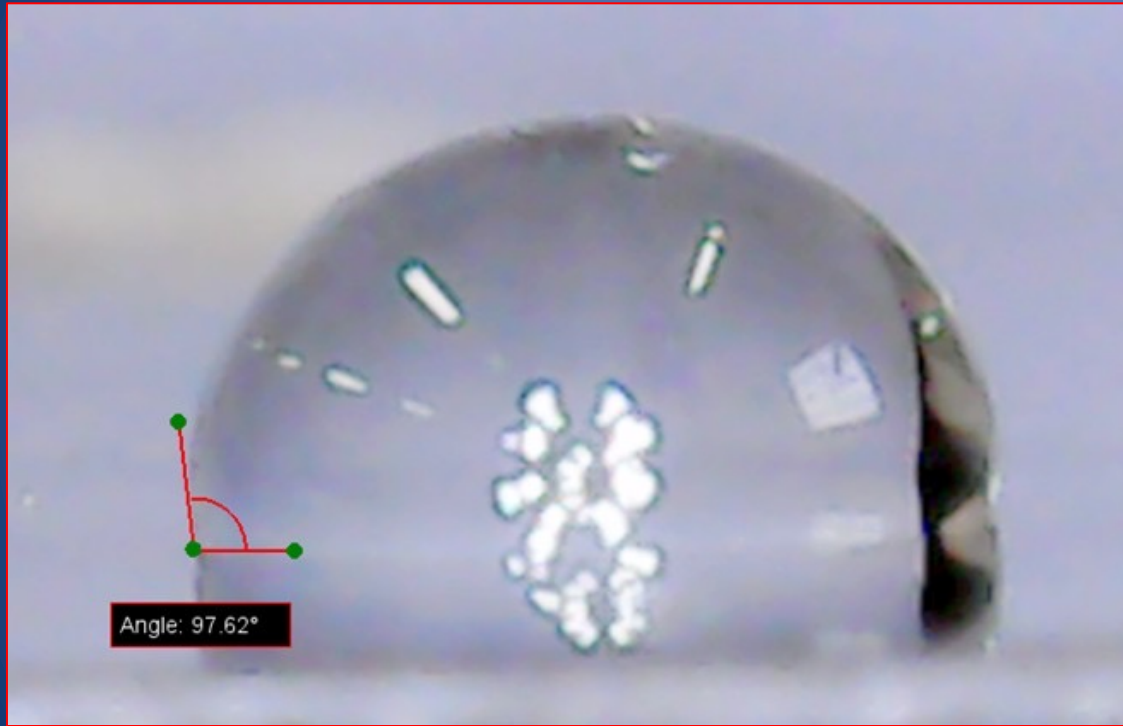
	Point-1	Point-2	Point-3
Element	Weight%	Weight%	Weight%
C	51.98	51.52	52.03
O	39.87	41.10	40.60
Al	0.93	0.94	0.80
Si	7.22	6.44	6.57
Totals	100.00	100.00	100.00

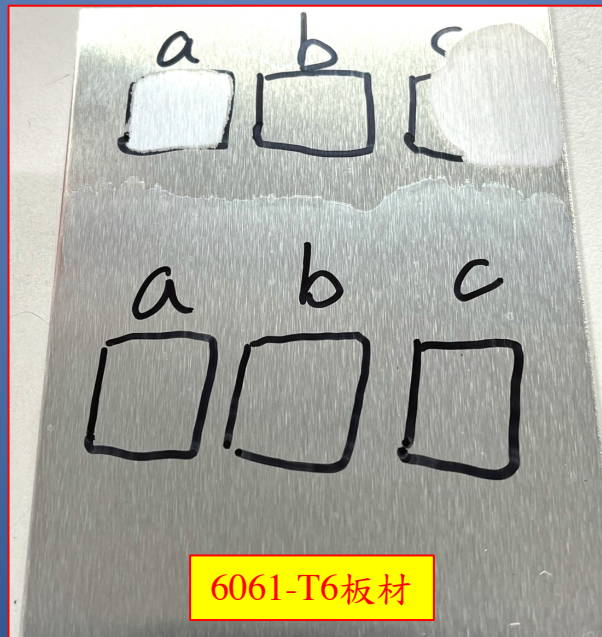
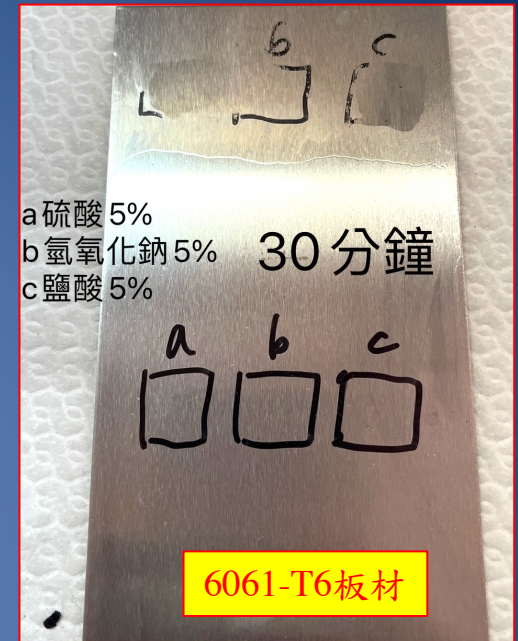


TGA Analysis



Contact angle

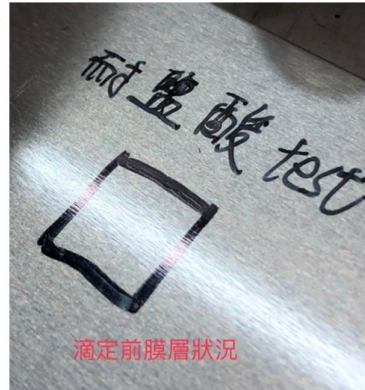
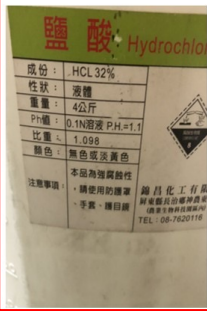




耐鹽酸測試報告

➢ 使用化工行販售之鹽酸溶液，調配酸鹼值為1以下進行膜層耐鹽酸測試

塗層塗料：**AS316**(烘烤條件**180度/30分鐘**)
 基 材：**304**不銹鋼板及**6061**鋁板
 測試時間：**30**分鐘



滴定前

滴定後

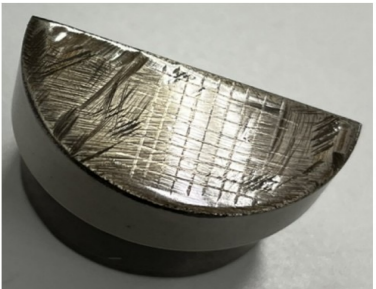
結果：
 滴定經過**30**分鐘後，將溶液擦拭觀察，膜層無異狀。

鑄鐵轉子百格密著試驗

樣品基材：球墨鑄鐵

測試膠帶：3M 600系列

	ASTM等級	結果判別
原始奈米塗層	5B	PASS
5%硫酸(a區域) 經48小時酸侵蝕	5B	PASS
5%鹽酸(c區域) 經48小時酸侵蝕	5B	PASS



原始奈米塗層

※照片利用反射拍攝便於觀察膜層狀態



經48小時酸侵蝕

鑄鐵轉子耐酸試驗

樣品基材：球墨鑄鐵
塗層：奈米塗層 AS331
烘烤條件：210度/30分

測試溶液：5%硫酸(a區域)、5%鹽酸(c區域)
滴定酸液溫度：室溫

※照片利用反射拍攝便於觀察膜層狀態

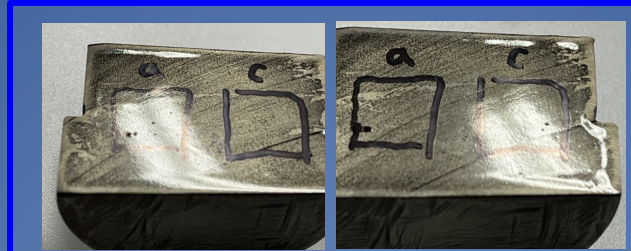
	24小時	48小時
樣品a (5% 硫酸)	Pass(無異狀)	Pass(無異狀)
樣品b (5% 鹽酸)	Pass(無異狀)	Pass(無異狀)
樣品a (5% 硫酸)	Pass(無異狀)	Pass(無異狀)
樣品b (5% 鹽酸)	Pass(無異狀)	Pass(無異狀)



樣品a:鑄鐵基材

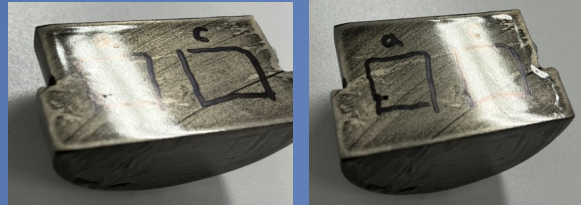


樣品b：鑄鐵基材+鎳鍍層



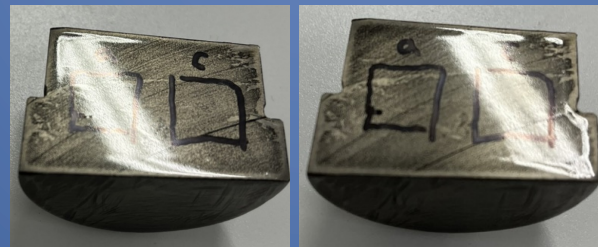
0小時

樣品a:鑄鐵基材+奈米塗層



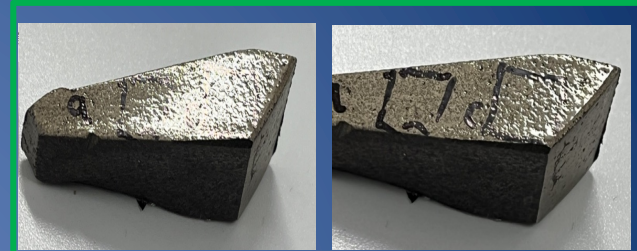
24小時

樣品a:鑄鐵基材+奈米塗層



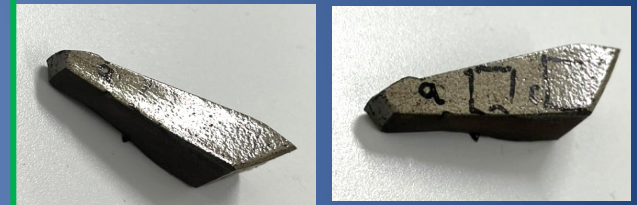
48小時

樣品a:鑄鐵基材+奈米塗層



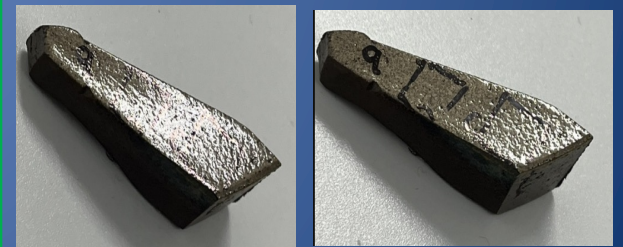
0小時

樣品b：鑄鐵基材+鎳鍍層+奈米塗層



24小時

樣品b：鑄鐵基材+鎳鍍層+奈米塗層

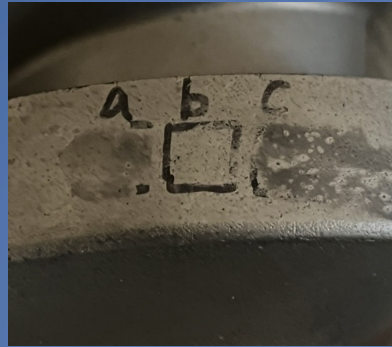


48小時

樣品b：鑄鐵基材+鎳鍍層+奈米塗層

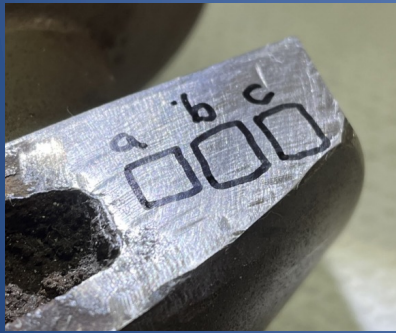


0小時



1小時

樣品b：鑄鐵基材+鎳鍍層



0小時



1小時

樣品c：鑄鐵基材(無塗層)



- 經過滴定5%硫酸(a區域)、5%鹽酸(c區域)1小時觀察，結果顯示無論是鑄鐵基材(無塗層)或是有鍍鎳層(中磷鎳層)之工件都有明顯收侵蝕的痕跡

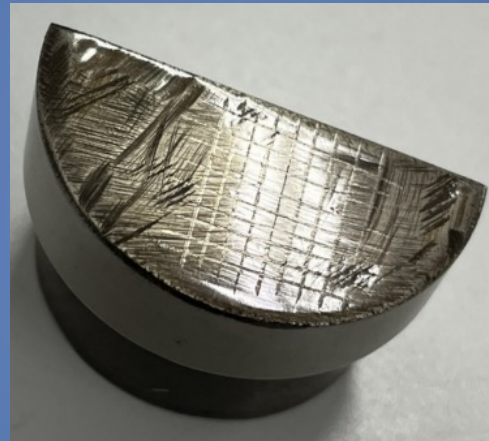
※照片利用反射拍攝便於觀察膜層狀態

鑄鐵轉子百格密著試驗

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原始奈米塗層



5%硫酸(a區域)



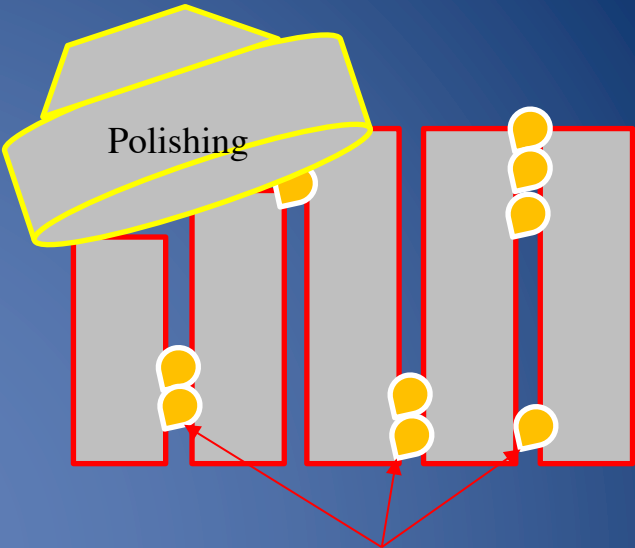
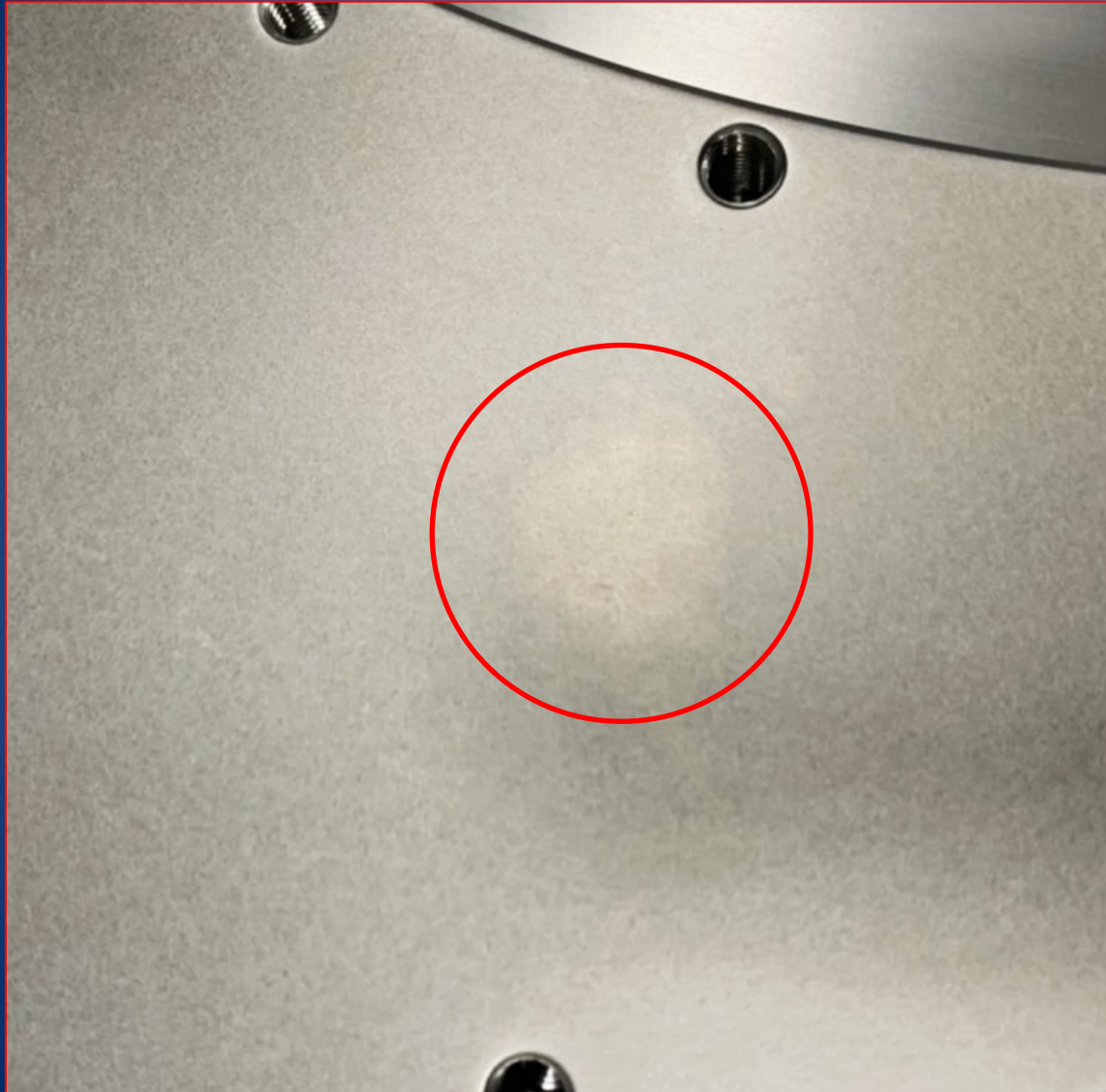
5%鹽酸(c區域)

經48小時酸侵蝕

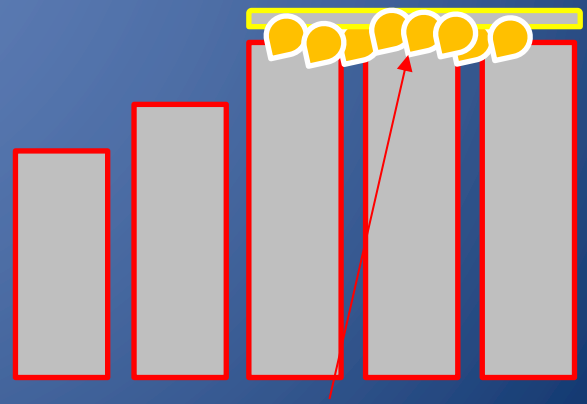
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- Defects on the surface
- **Experimental**
- Recommendations for improvement

Explanation below



切削油分子

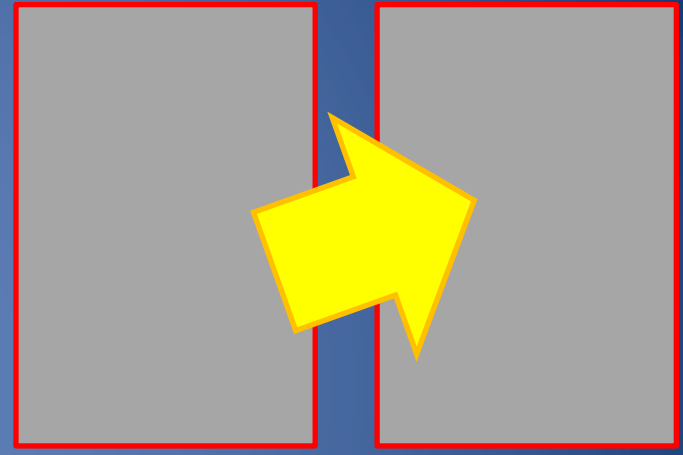
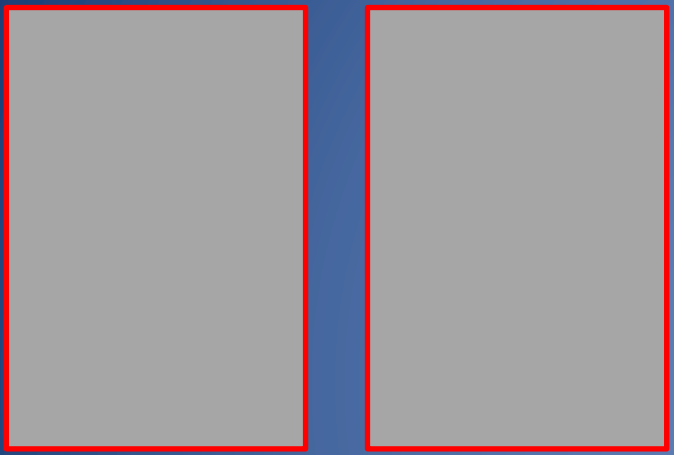


切削油分子

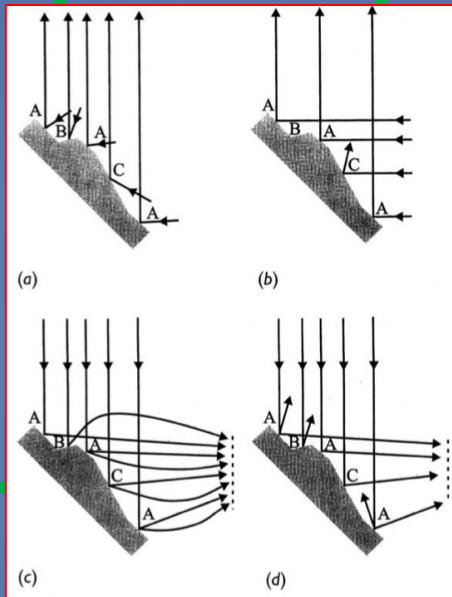
Experimental

Heated with wipe pollution

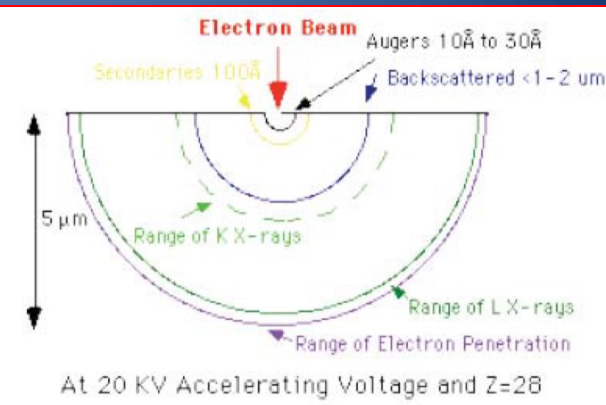
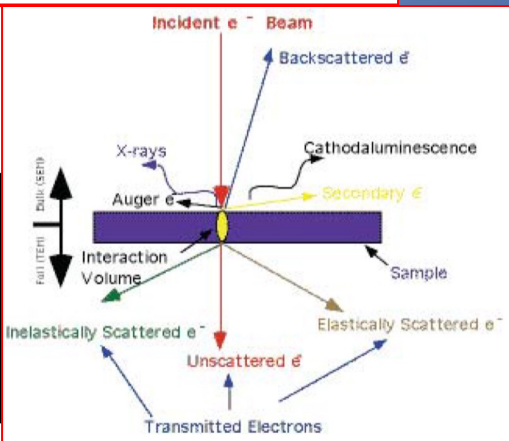
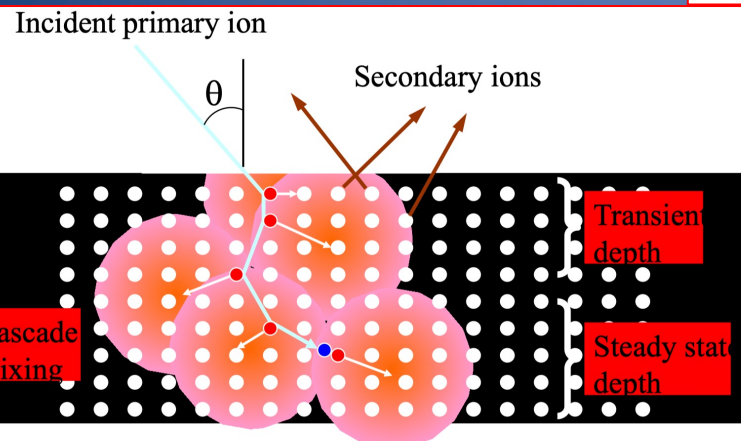
Heated without wipe pollution



FE-SEM

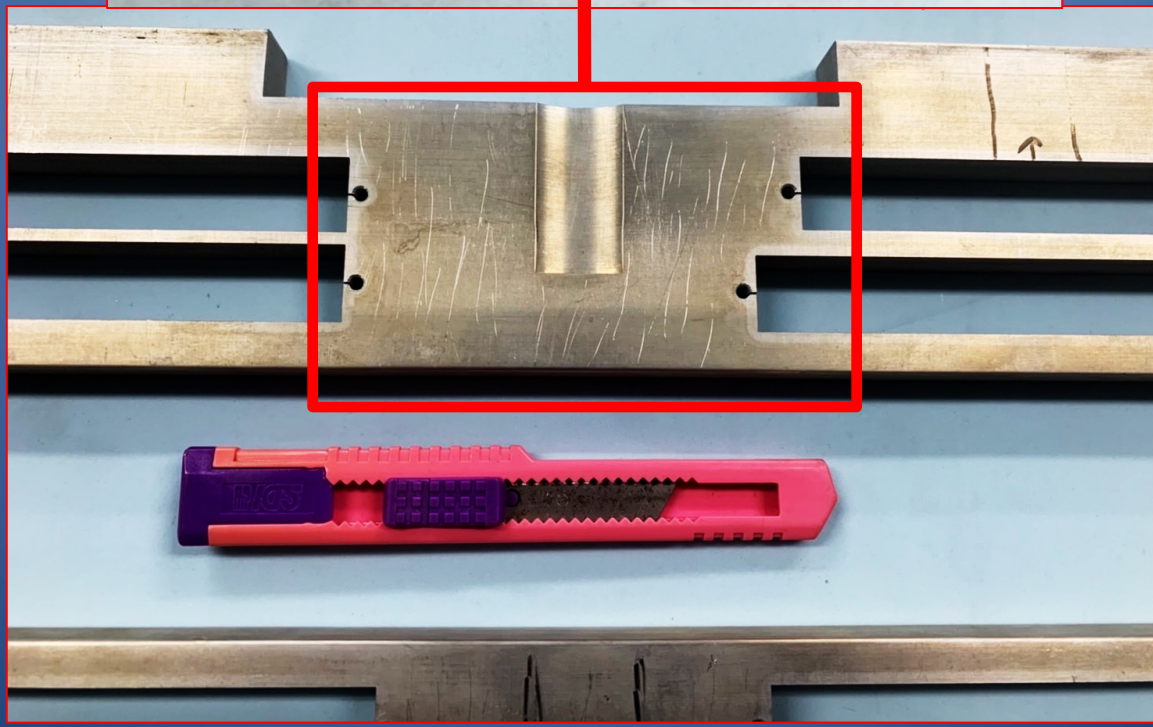
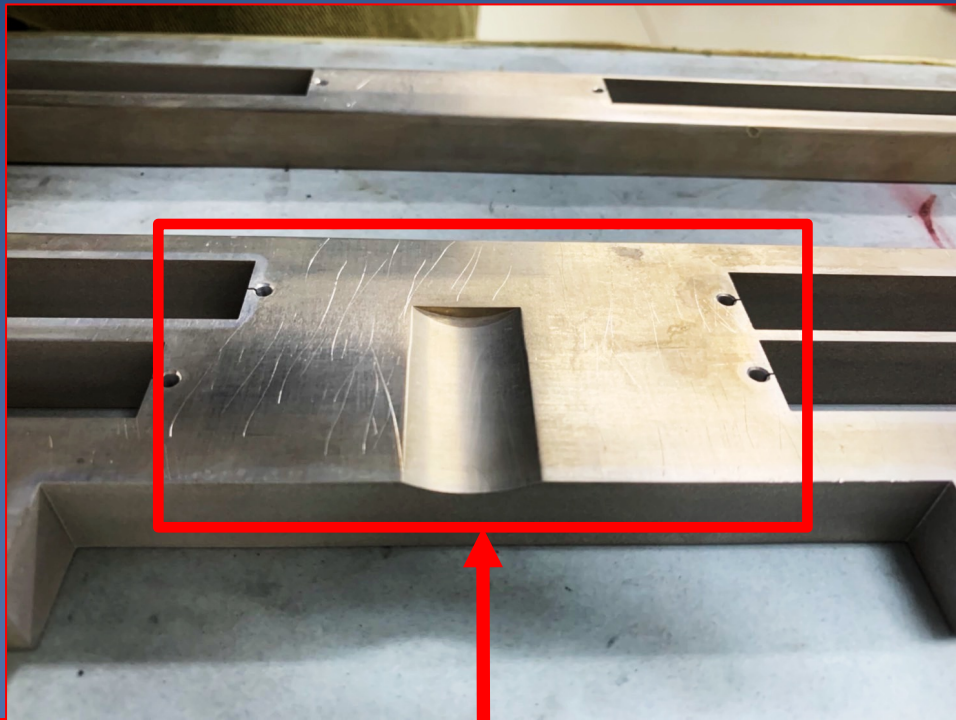


SIMS



Outline

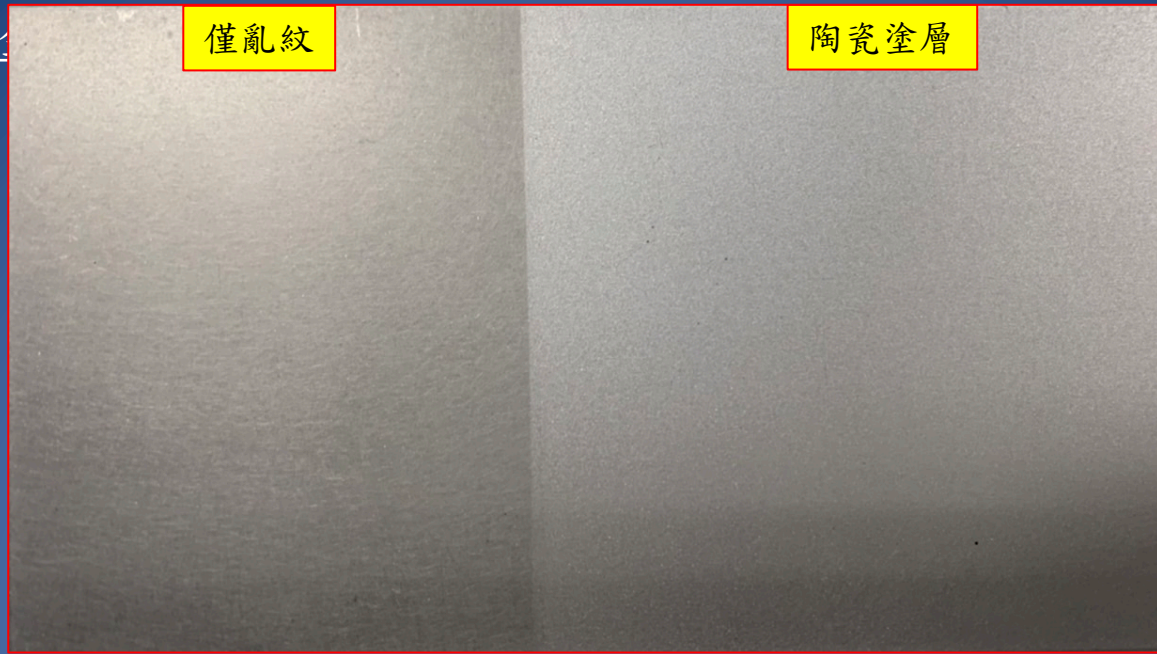
- Process
- Properties
- Defects on the surface
- Experimental
- **Recommendations for improvement**



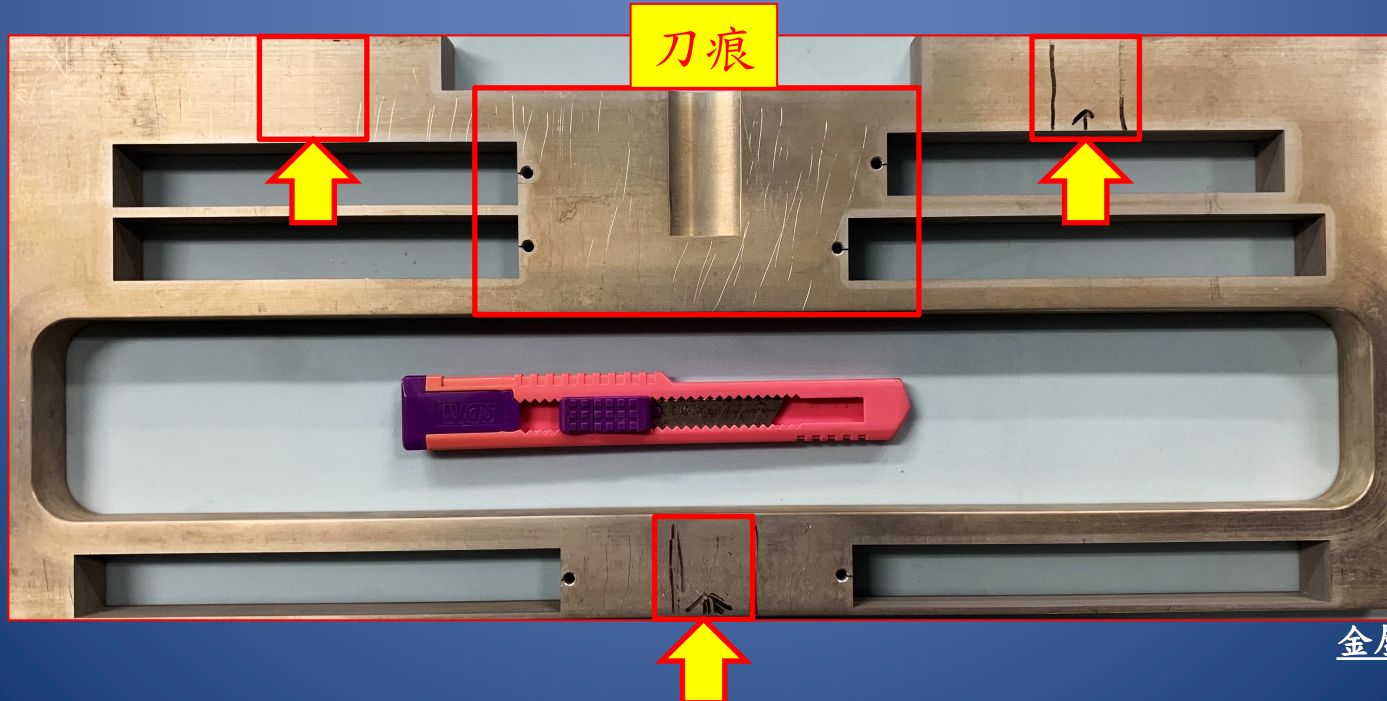
僅亂紋

陶瓷塗層

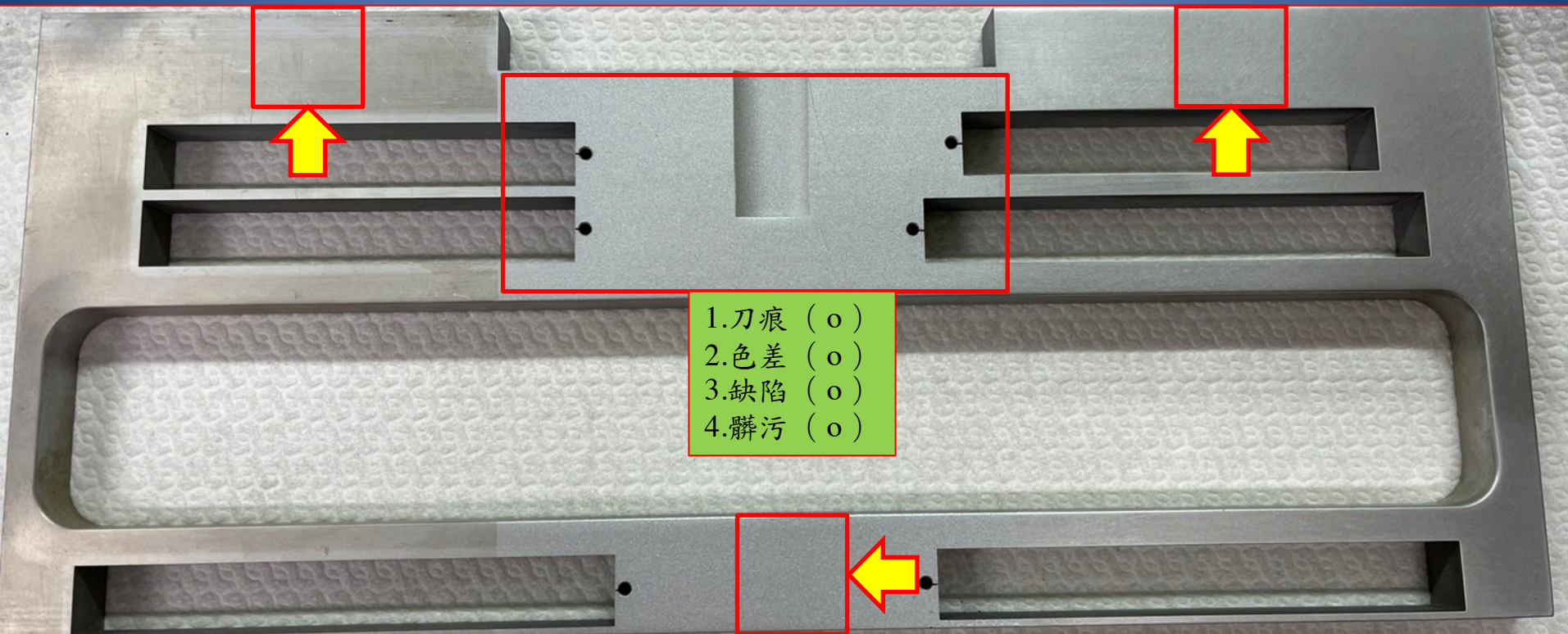
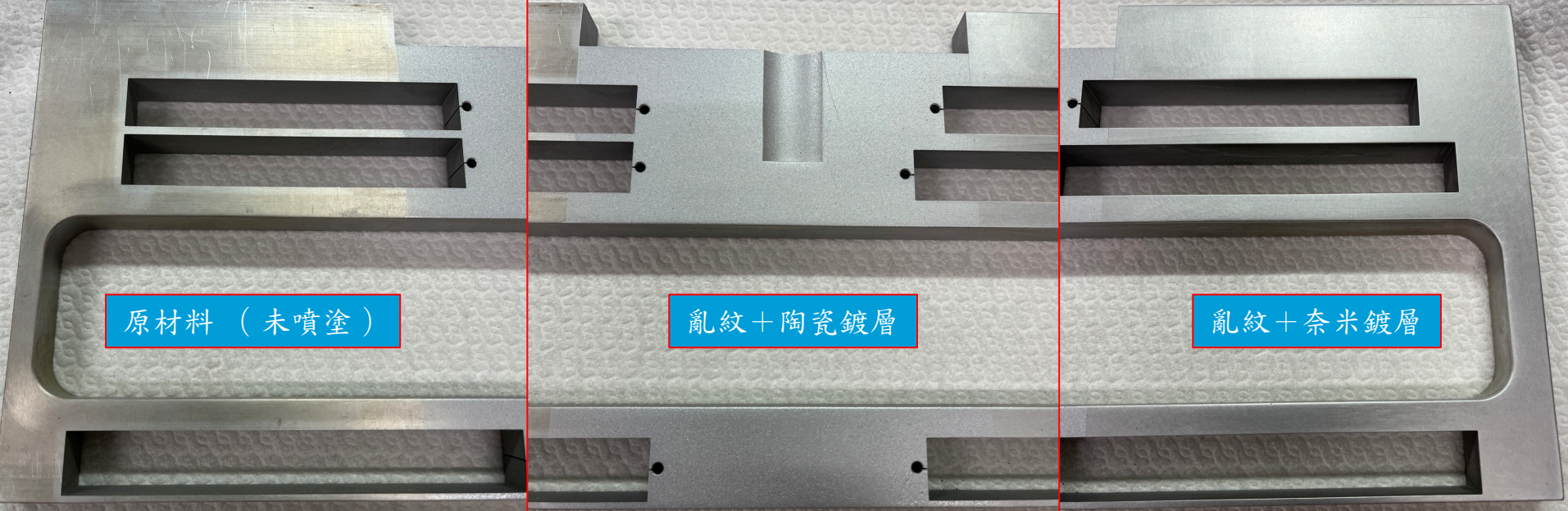
After



Before



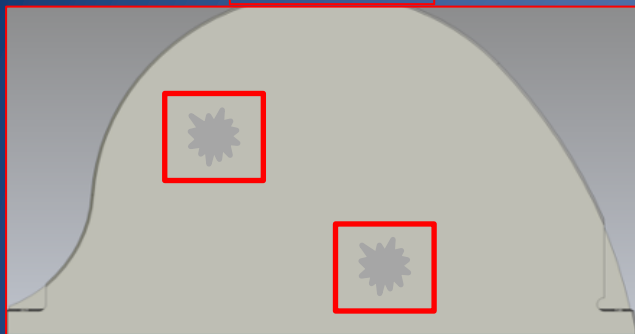
刀痕



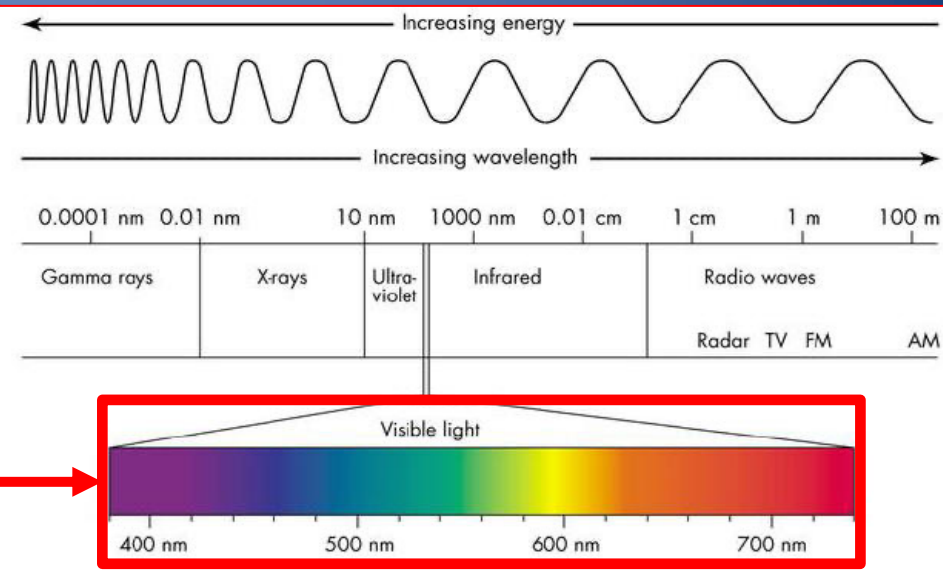
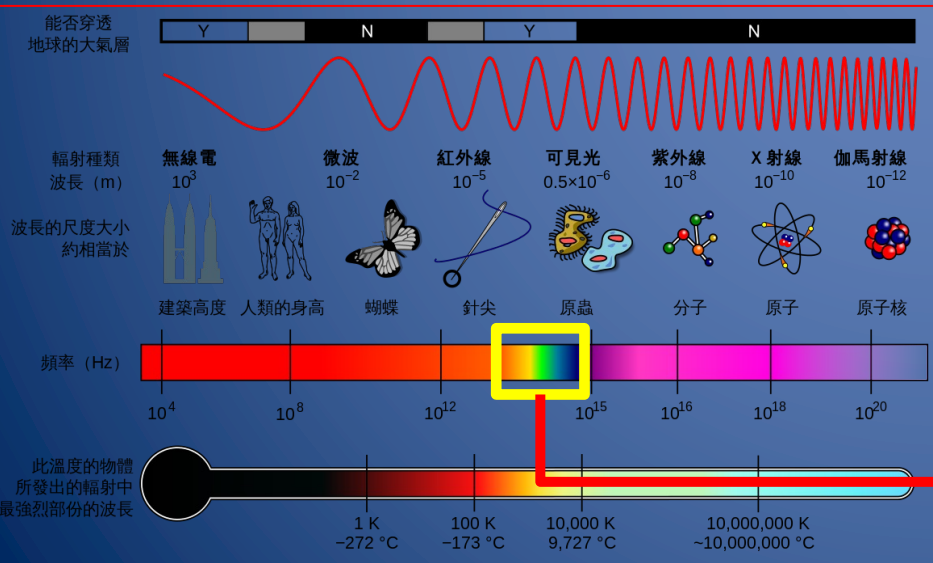
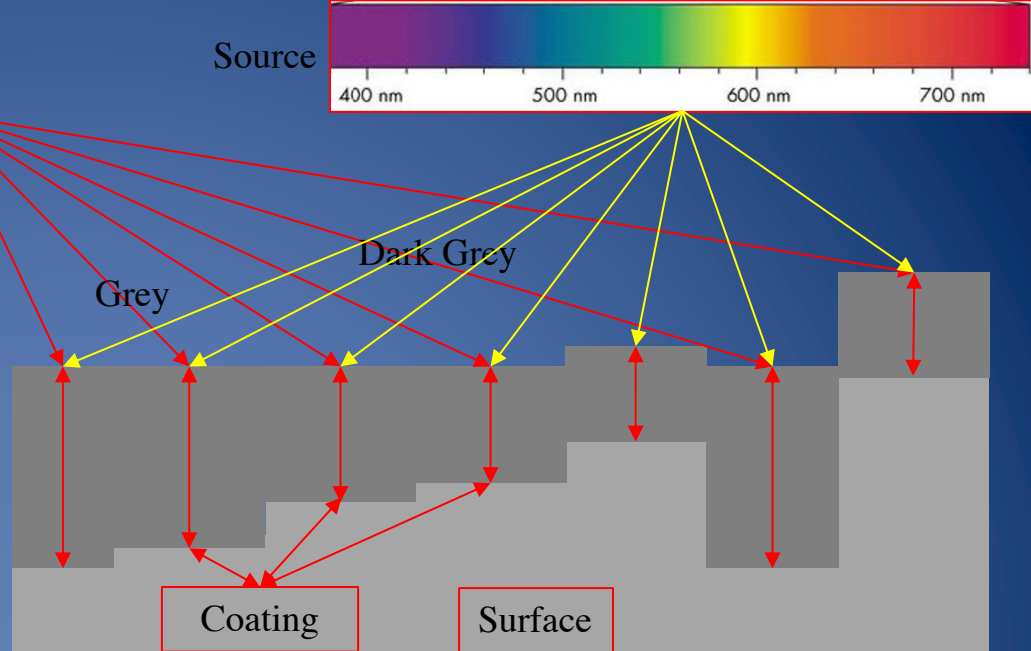
Ethanol Formula: C_2H_5OH

Acetone Formula: C_3H_6O

Completed



Eyes



Oxidation reaction	Substance loses oxygen	Matter loses electrons	Substance increased oxidation number
Reduction reaction	Substance gets oxygen	Matter gets electrons	Substance reduced oxidation number

Notes:

1. Oxidation reaction and reduction reaction must occur at the same time.
2. When a substance is oxidized, a substance must be reduced.

What is oxidation

The substance itself undergoes a reduction reaction and another substance undergoes an oxidation reaction, which is called an oxidant. When a substance reacts, it gains electrons

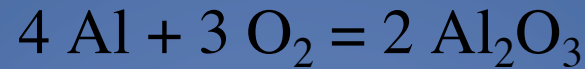
What is restoration

The substance itself undergoes an oxidation reaction and another substance undergoes a reduction reaction, which is called a reducing agent. Substances lose electrons when reacting

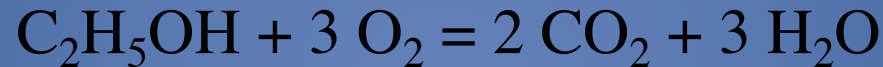
Oxidizer	Reduction product	Oxidizer	Reduction product
O_2	O^{2-}, O_2^{2-}, O_2	MnO_4^-	MnO_2
H_2O_2	H_2O	MnO_4^-	Mn^{2+}
F_2, Cl_2, Br_2, I_2	F^-, Cl^-, Br^-, I^-	MnO_4^-	MnO_4
H_2SO_4	SO_2, H_2S, S	MnO_4^-	Cr^{3+}
HNO_3	NO_2, NO, N_2, NH_3	---	---

Reduction	Oxidation products	Reduction	Oxidation products
H_2	H^+	Fe^{2+}	Fe^{3+}
H_2O_2	O_2	alkali metal	M^+
Cl^-, Br^-, I^-	Cl_2, Br_2, I_2	rare earth metal	M^{2+}
Sn^{2+}	Sn^{4+}	Zn	Zn^{2+}

ISO400



Ethanol Formula: C₂H₅OH



Acetone Formula: C₃H₆O

