

(2017.01.16 Revised)

# Comparison Evaluation of Power Inductors



## はじめに



**KETI (韓国電子検査院) は、韓国政府支援により韓国電子部品・製品の発展のためその研究開発支援/部品評価支援を行う独立行政機関です。弊社 (J-chip) とは、2008年に業務提携を行っています。**

**今回の対象でありますインダクター製品試験につきましては、下記の取り決めにより実施しております。**

- ・試験対象部品メーカーの中に韓国メーカーを含む事**
- ・試験方法については、KETI/J-chip双方にて協議する事**
- ・試験方法はブライド方式とする事 (公平性を維持するため)**
- ・KETIでは、試験実施/データ提供のみとする (考察は各自で実施する)**

**従いまして、報告文面途中にて弊社 (J-chip) の判定/コメントを加筆しています。ご理解の程宜しくお願ひします。**

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# I. Introduction

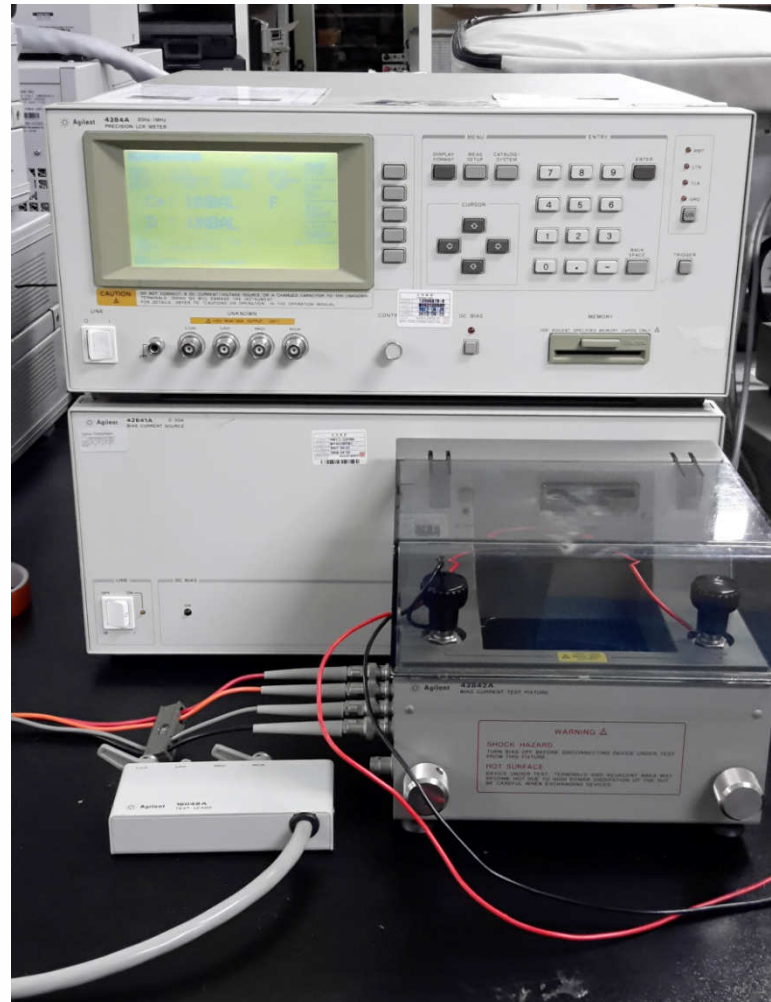


## Introduction

- **Specimen:** Power Inductor
- **Test:**
  - Electrical property measurements
  - X-ray analyses
  - SEM analyses
  - Environmental tests
- **Test term:** 2016. 12. 12 ~ 2017. 01. 09
- **Test environment:** (25 ± 5) °C, Below 75% room humidity
- **Test apparatuses:**
  - Precision LCR meter (4284A, Agilent, USA)
  - Test cable assembly (16048A, Agilent, USA)
  - X-ray (Revolution, X-tek, USA)
  - Focused ion beam (Quanta 3D DualBeam, FEI, Netherland)
  - Temperature and humidity environmental test chamber (Excal 5425H, Climates, France)
- **Etc:** Blind test
- **Contact:** Lee, Ju Ho ☎ +82-31-789-7282 / [leejuho@keti.re.kr](mailto:leejuho@keti.re.kr)

## Introduction

- **Test apparatuses:**
  - Precision LCR meter with test cable assembly cable (4284A, 16048A, Agilent, USA)



## Introduction

- **Test apparatuses:**
  - X-ray (Revolution, X-tek, USA)



## Introduction

- **Test apparatuses:**
  - Focused ion beam (Quanta 3D DualBeam, FEI, Netherland)





## Introduction

- **Test apparatuses:**
  - Temperature and humidity environmental test chamber (Excal 5425H, Climates, France)



## Specimens



Sample	Inductance		$R_{dc}$ (max) ( $\Omega$ )	Rated DC current (A)		Operation temp. ( $^{\circ}\text{C}$ )
	L ( $\mu\text{H}$ )	Tol. (%)		$I_{dc}$ (max)	$I_{dc}$ (typ.)	
<b>A</b>	47	$\pm 20$	0.013	2.00	1.80	-40 ~ +125
<b>B</b>	40	$\pm 20$	0.075	1.8	1.35	-40 ~ +100
<b>C</b>	47	$\pm 20$	0.075	2.5	3.13	-20 ~ +85

- Test voltages of sample A, B, and C are 0.1, 0.1, 0.5 V, respectively.
- Test frequencies of sample A, B, and C are 100, 1, 100 KHz, respectively.

## Specimens

<J-chip comment>



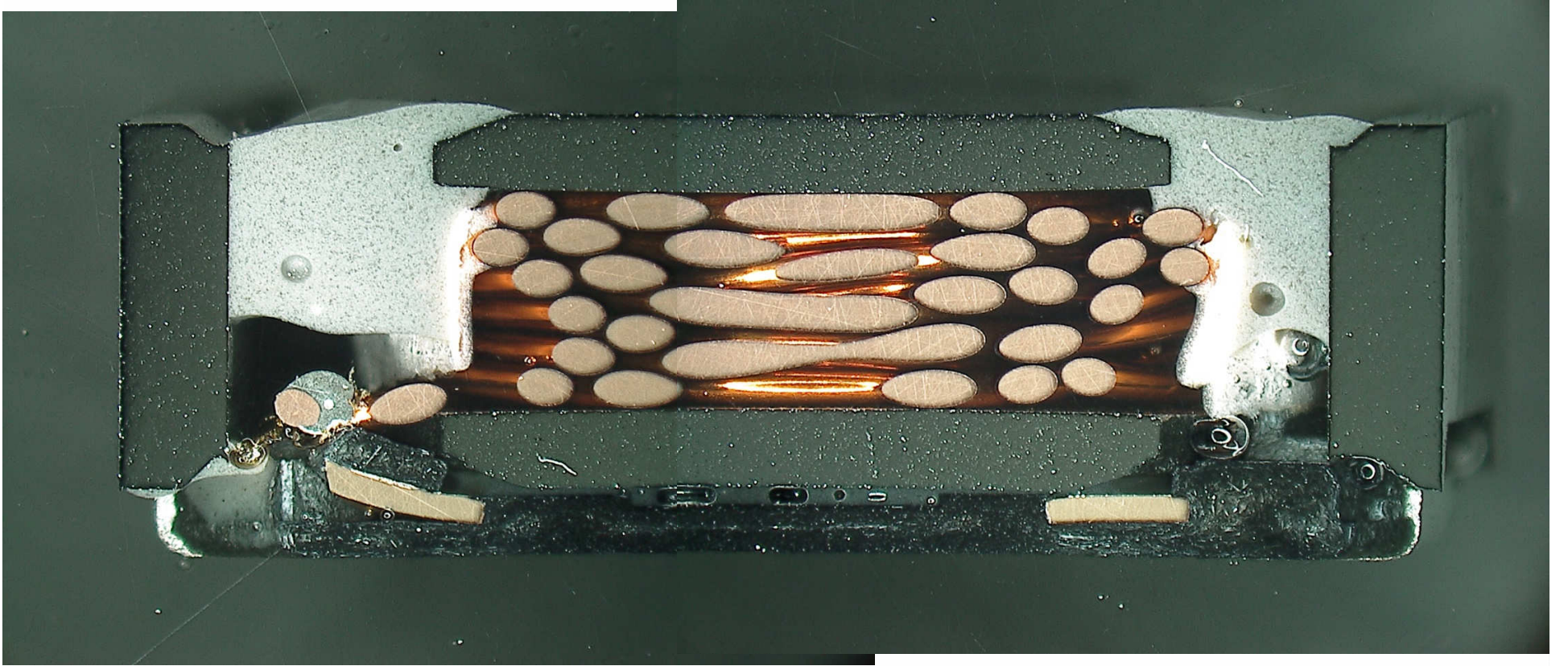
To keep a fairness of 3 companies nationality, should be evaluated by using **blind method** (close company name). After tests, open the actual company as below.

Code	Maker	Parts number code	Specification	Size
A	BOURNS (USA)	SRR1240-470M	47 uH ± 20%、DCR=0.135Ω max(25°C) Is=1.8A(Δt=40°C)、Q=19	12.5x12.5x4
B	SUMIDA (JAPAN)	CDRH125NP-470M	47 uH ± 20%、DCR=0.075Ω max(25°C) Is=1.8A(Δt=40°C)	12x12x6
C	ABC O (KOREA)	LPF1260T-470M	47 uH ± 20%、DCR=0.075Ω max(25°C) Is=3.13A(Δt=40°C)	12x12x6

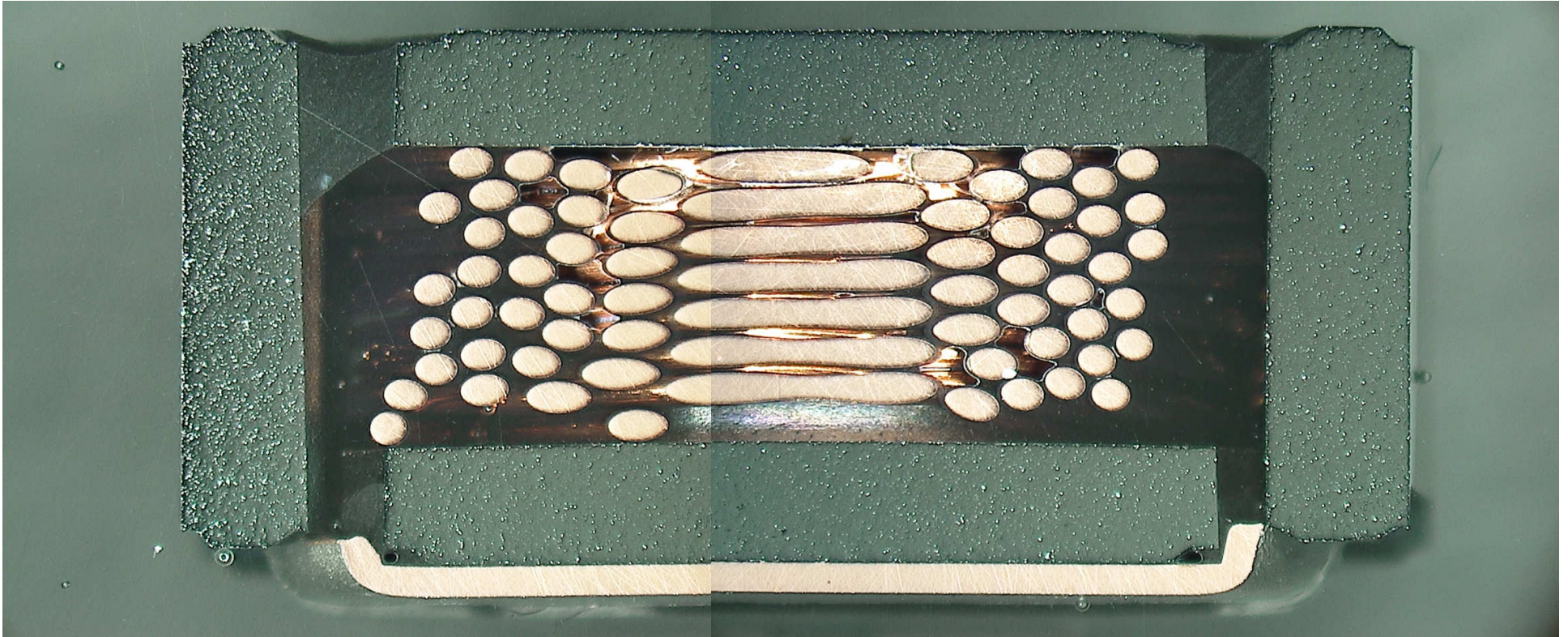
## II. Optical microscope analyses (内部短面観察)



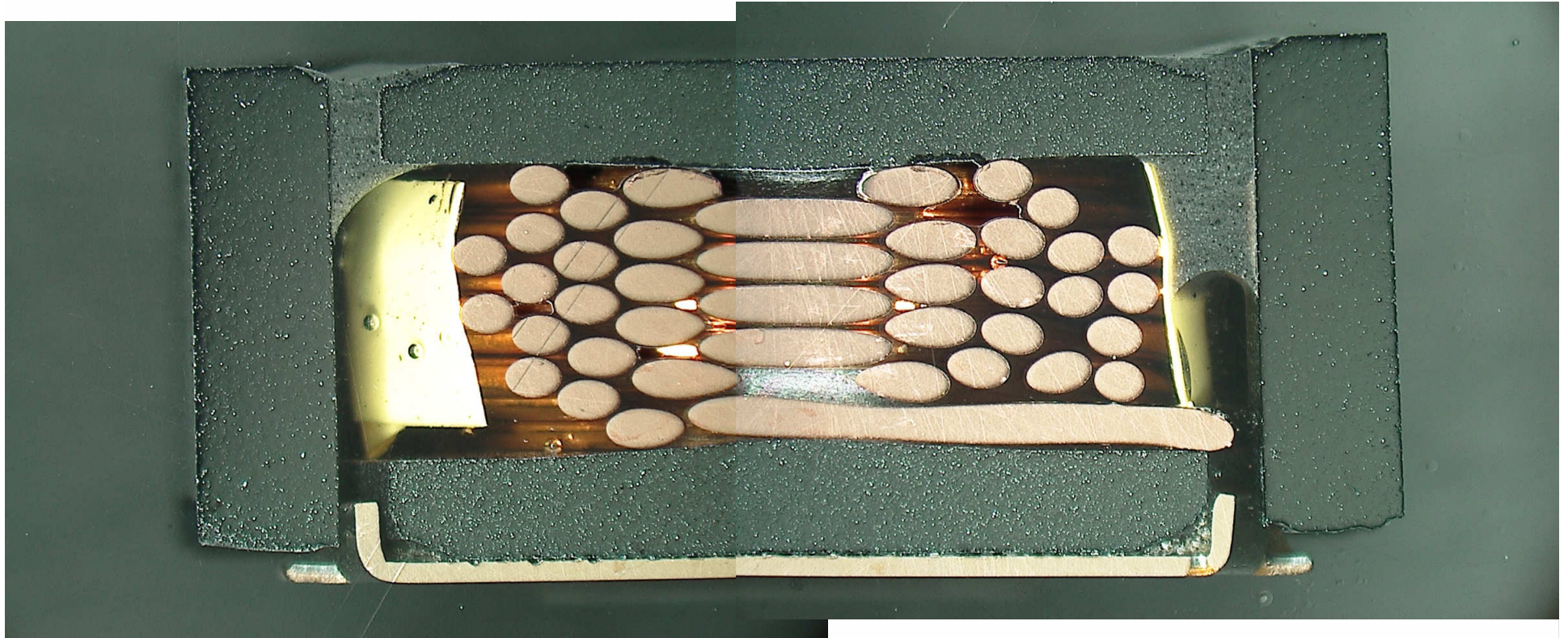
A社



B社



C社

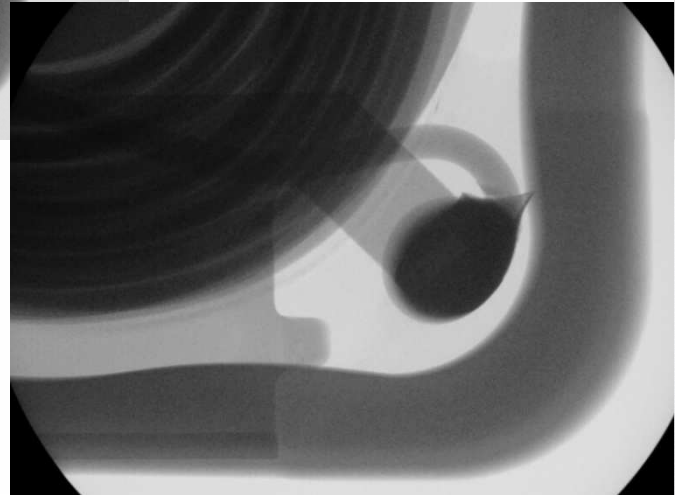
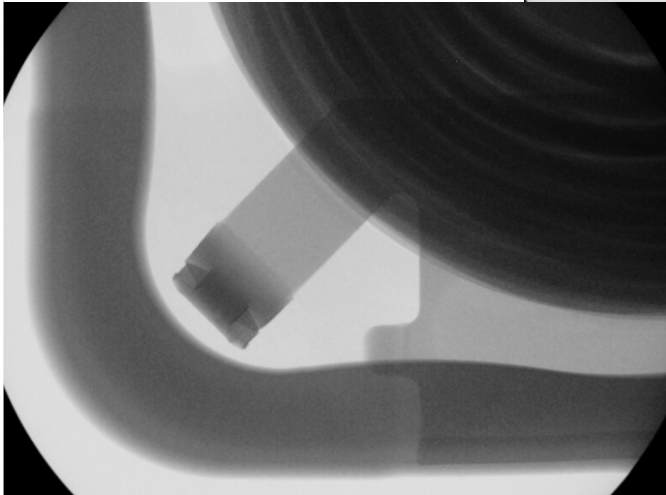
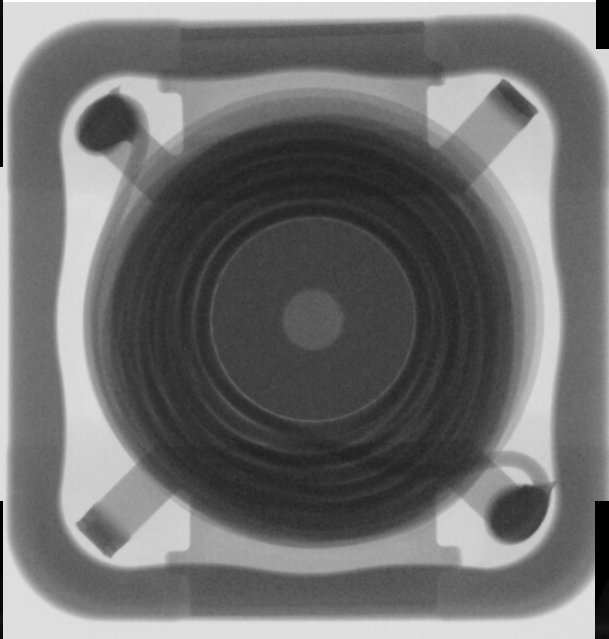
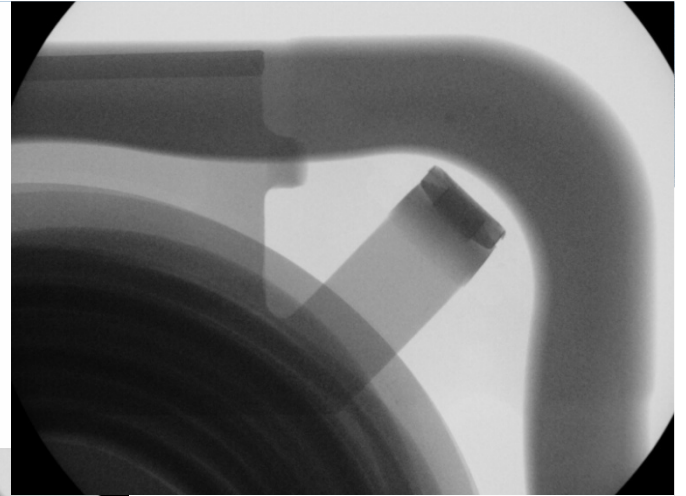
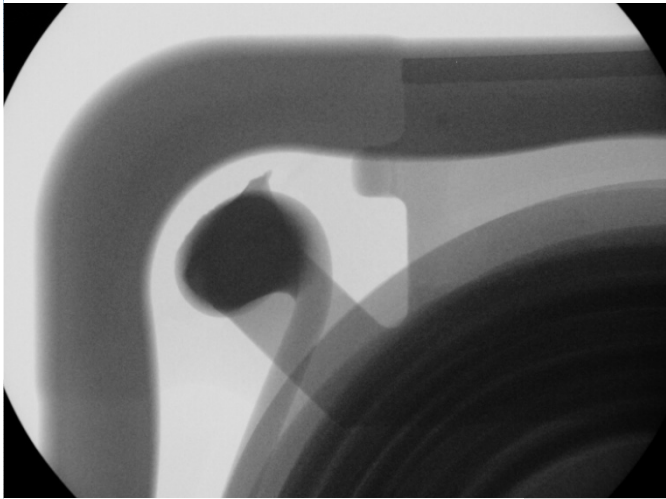


# III. X-ray analyses

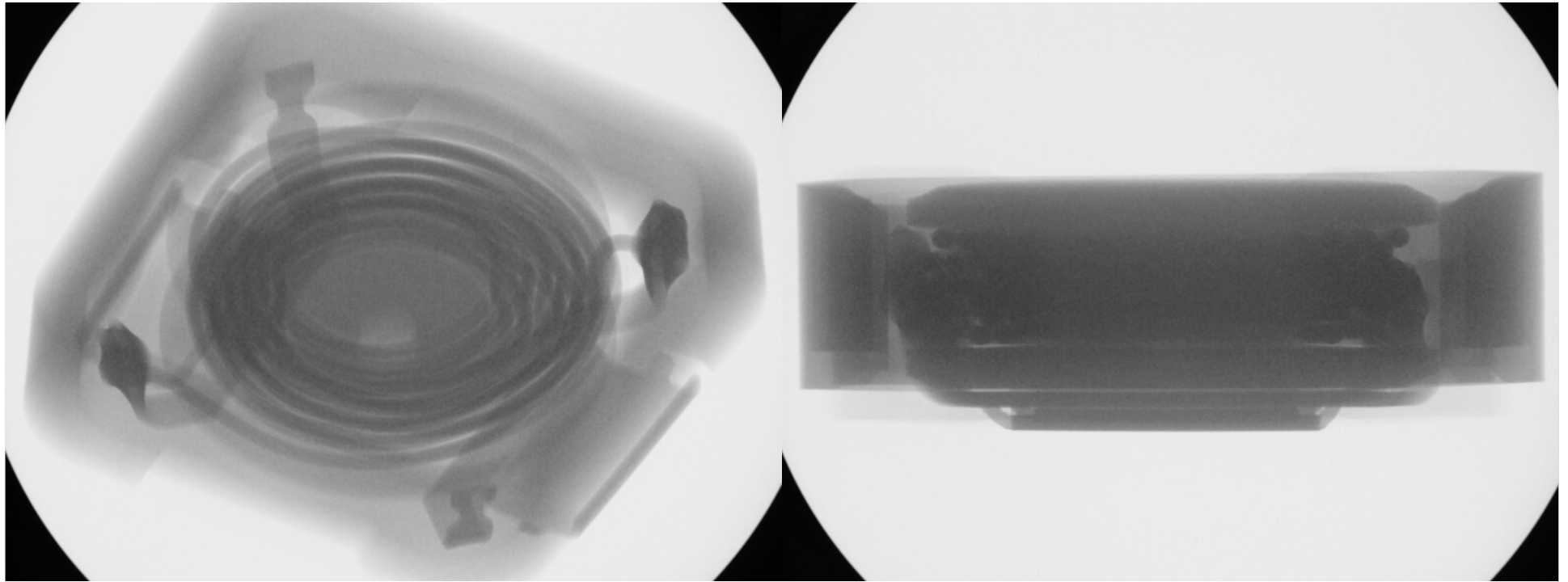




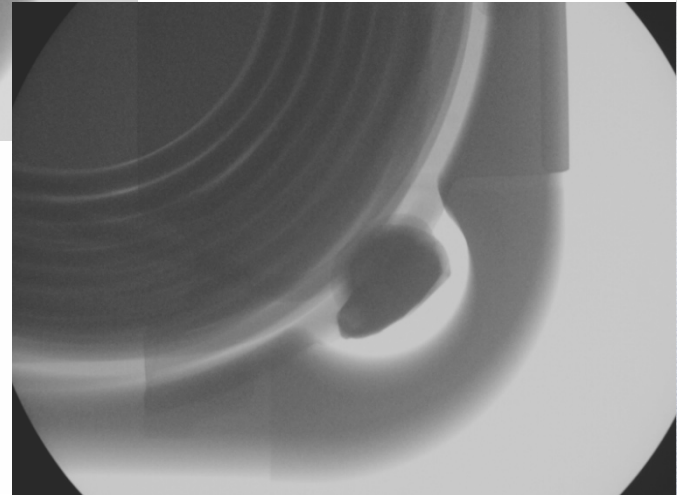
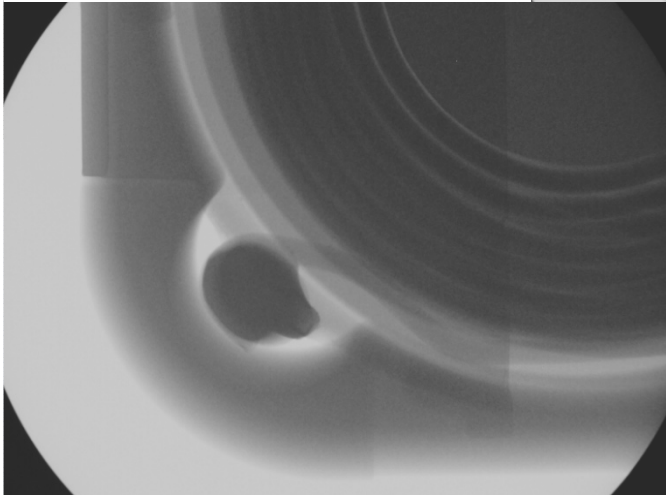
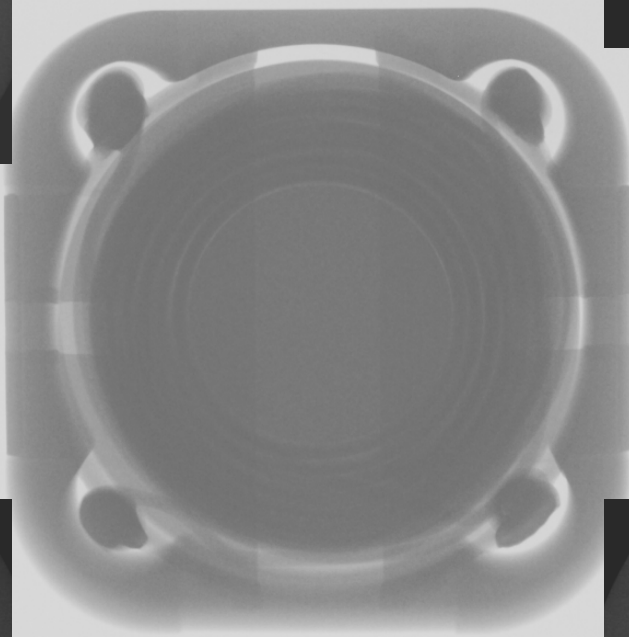
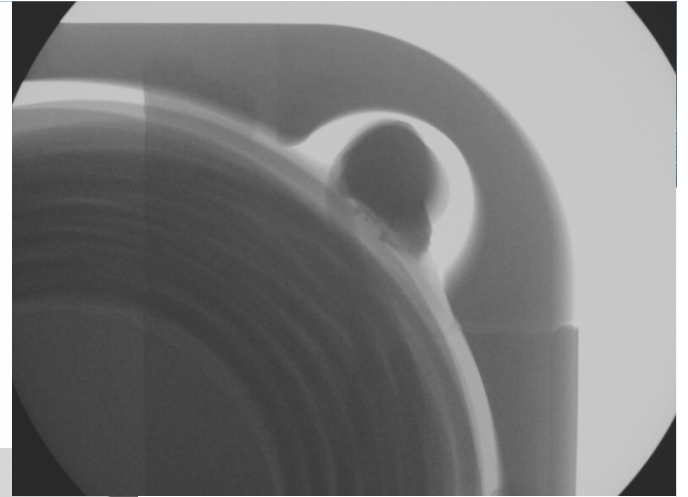
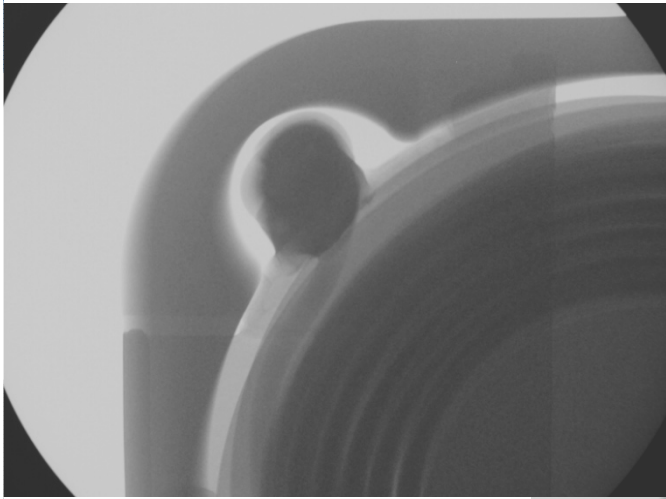
A社



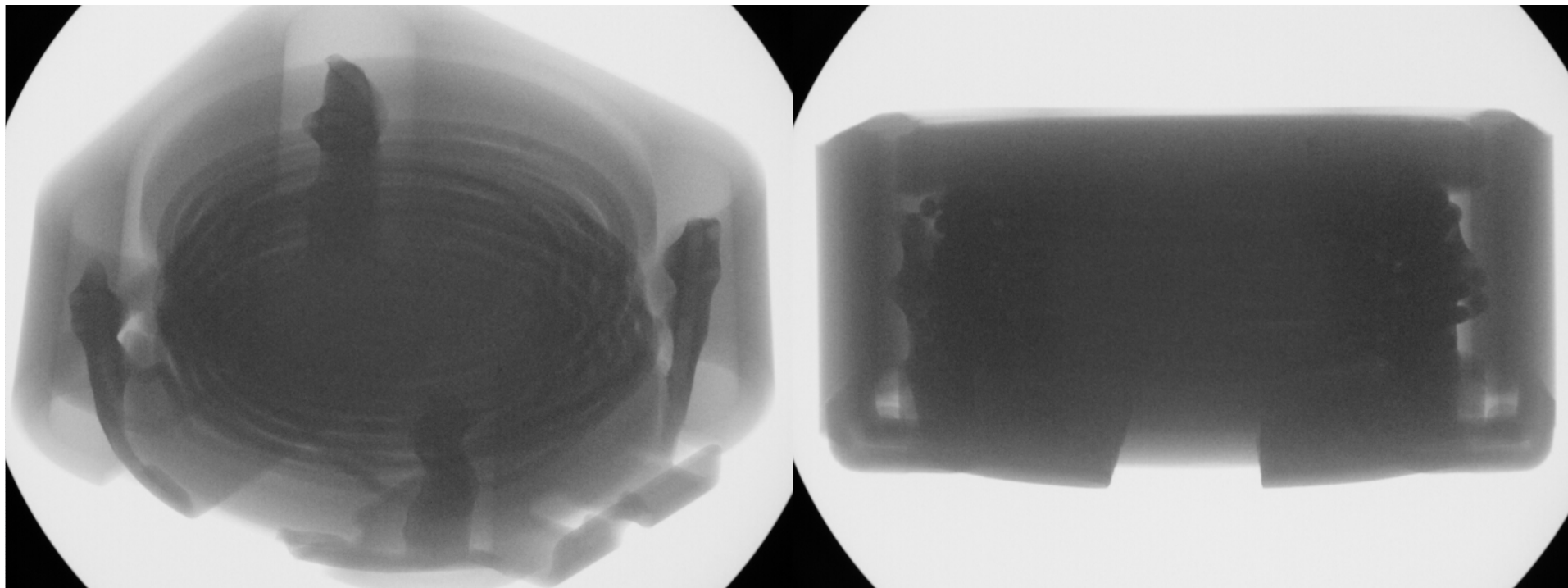
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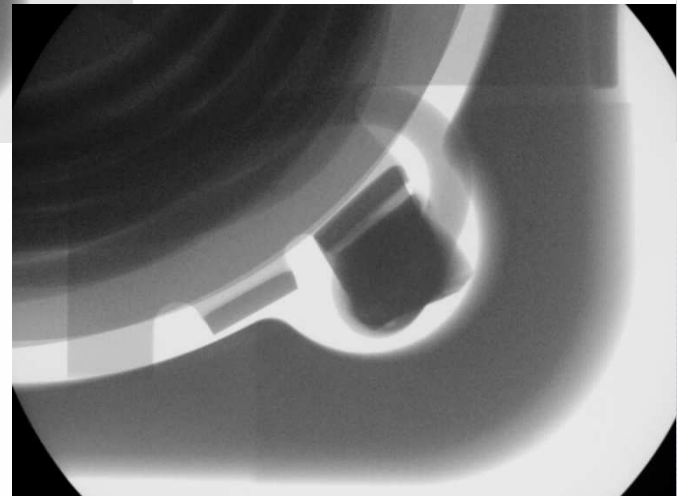
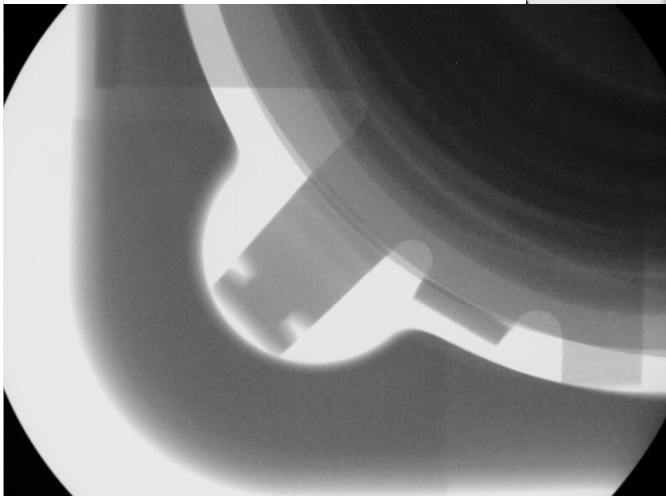
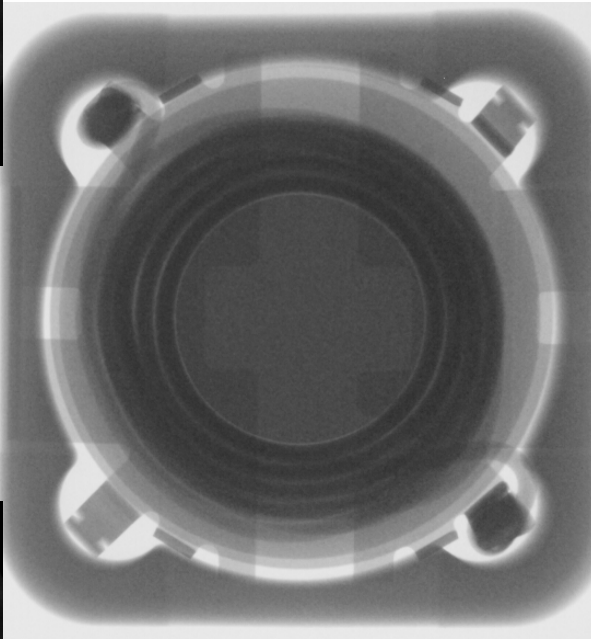
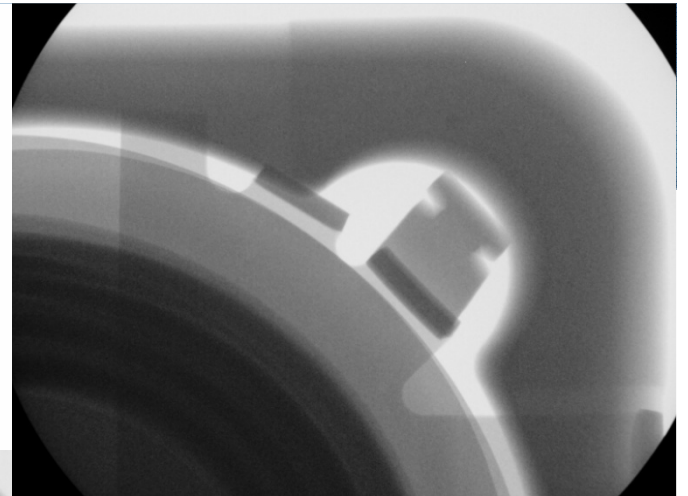
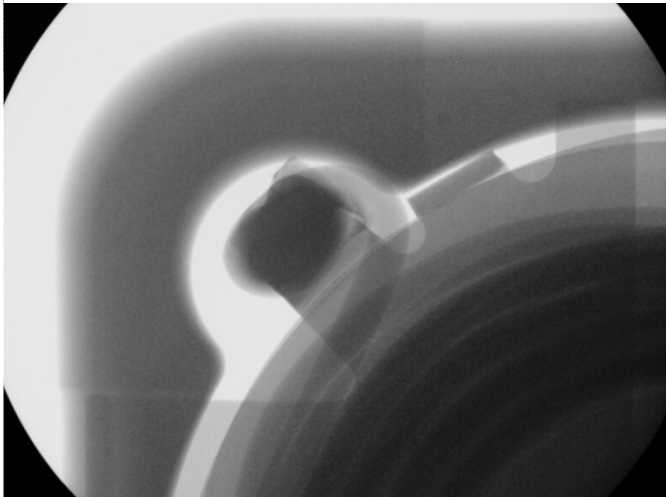
**B社**



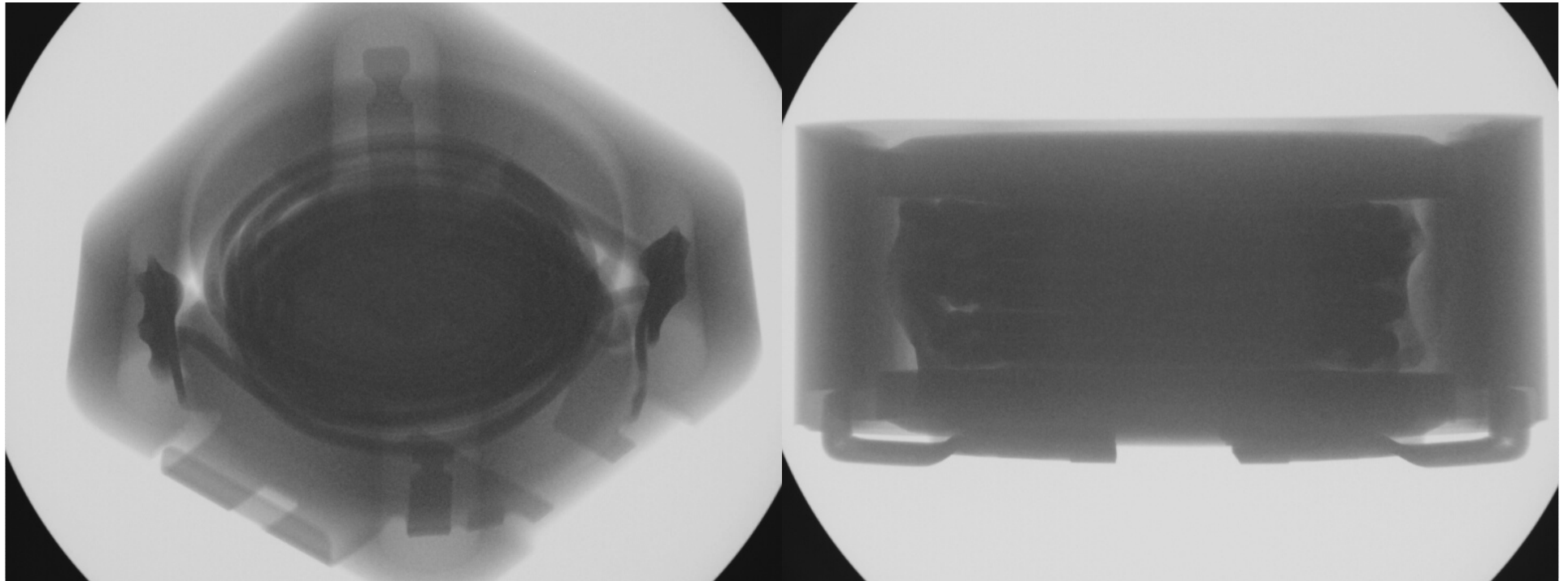
**B社**



C社



C社



## Summary

Code	Maker	Parts number code	Optical analyses (内部断面観察)	X-ray (内部構造観察)
A	BOURNS (USA)	SRR1240-470M	No problem 異常無し	There is no foreign objects (異物無し)
B	SUMIDA (JAPAN)	CDRH125NP-470M	No problem 異常無し	There is no foreign objects (異物無し)
C	ABCO (KOREA)	LPF1260T-470M	No problem 異常無し	There is no foreign objects (異物無し)

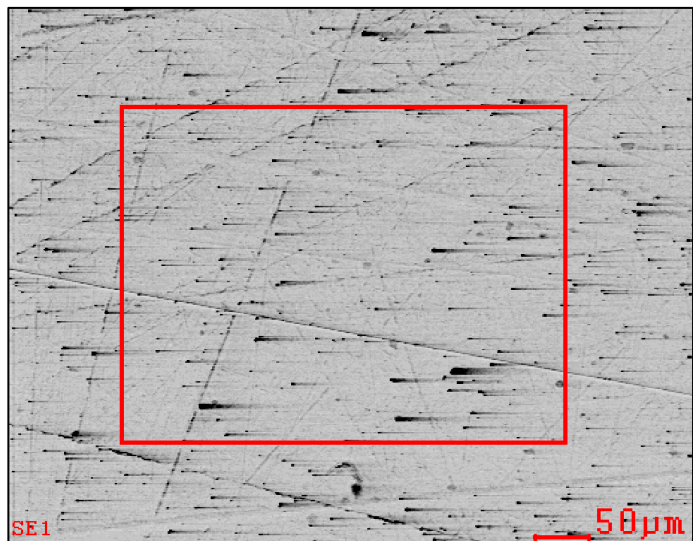
### <Total Judgement>

All of samples results are no problem, because it has no foreign objects.

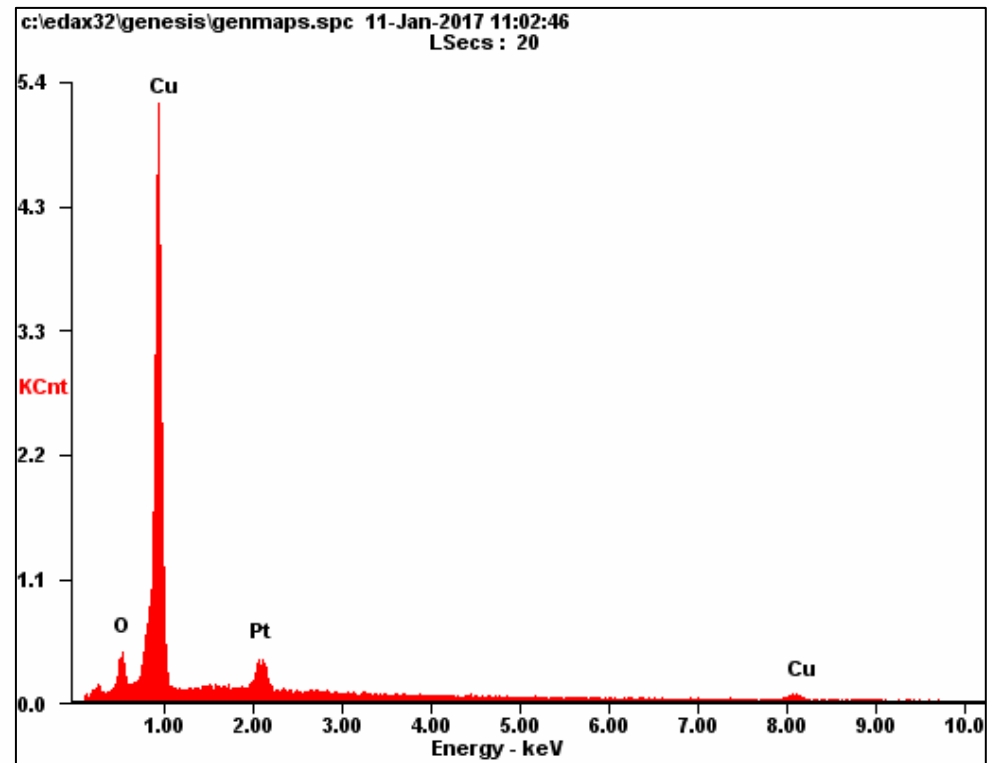
# III. SEM analyses

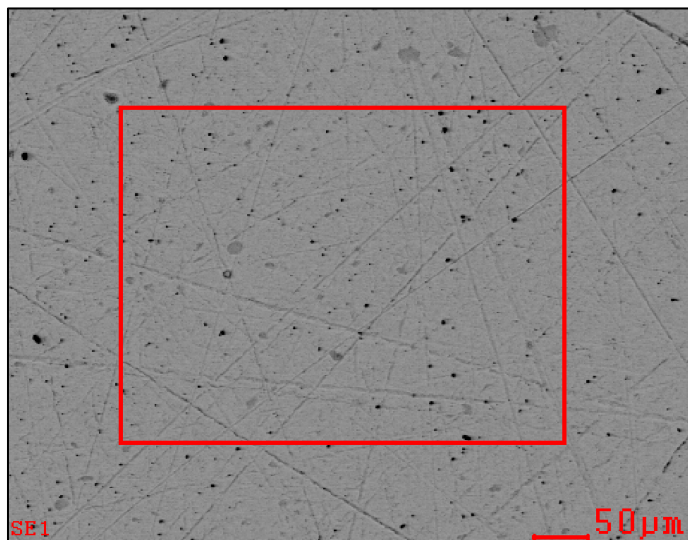




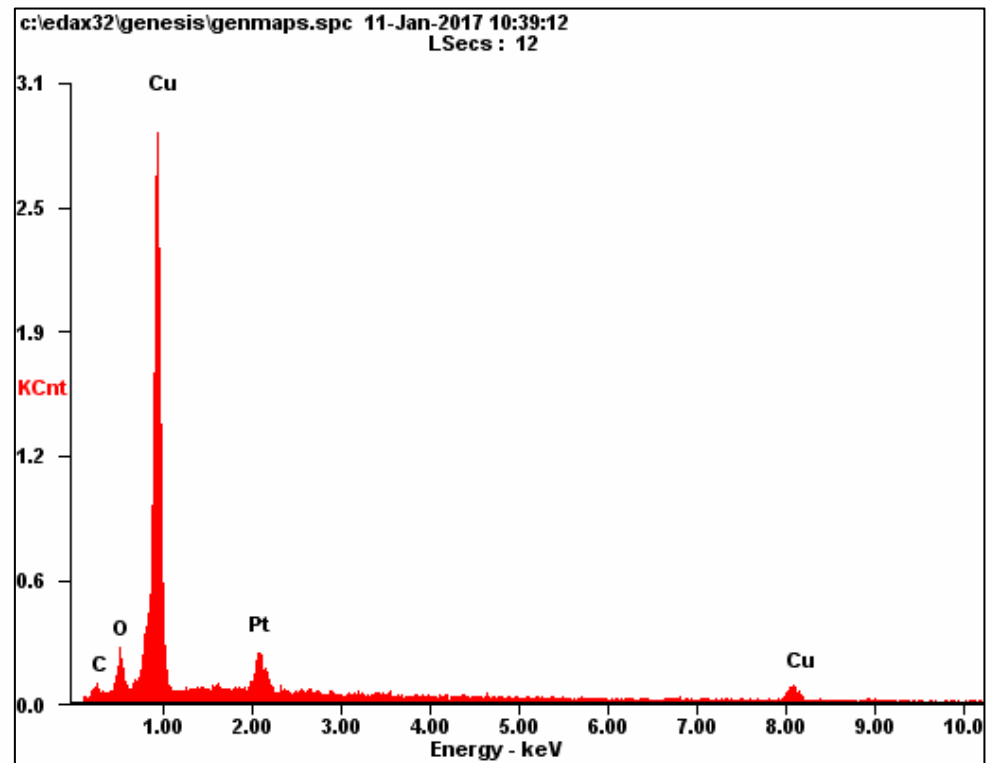


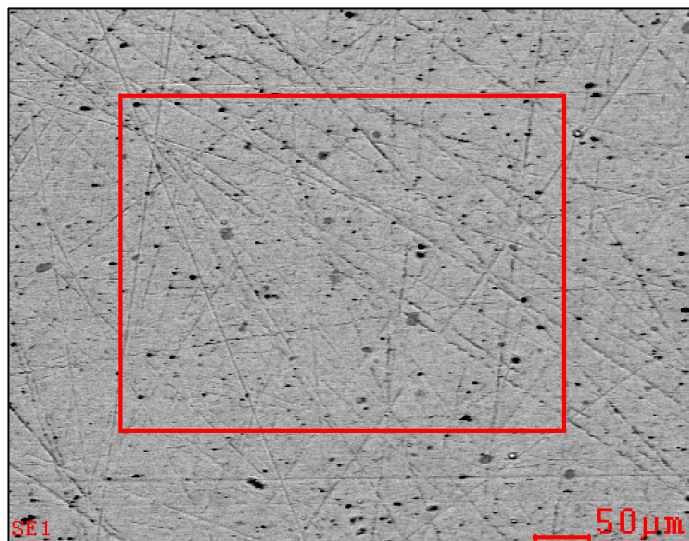
Element	Wt%	At%
O	29.83	74.34
Pt	43.45	08.88
Cu	26.73	16.77
Matrix	Correction	ZAF





Element	Wt%	At%
C	11.20	32.05
O	19.73	42.40
Pt	32.41	05.71
<b>Cu</b>	36.66	19.84
Matrix	Correction	ZAF





Element	Wt%	At%
C	15.86	32.36
O	40.36	61.85
Pt	42.68	05.36
<b>Cu</b>	01.10	00.42
Matrix	Correction	ZAF

