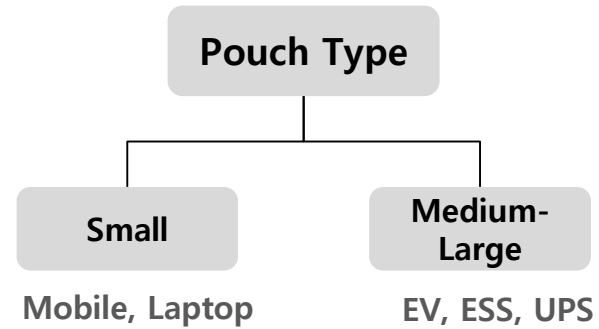
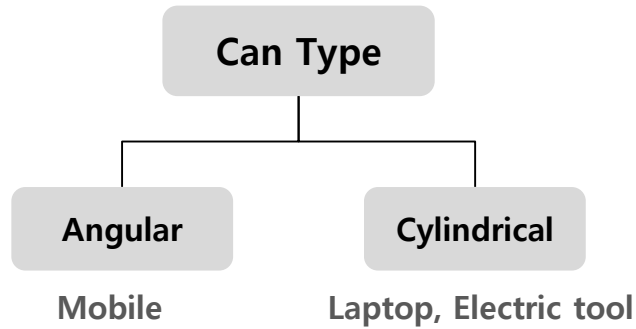


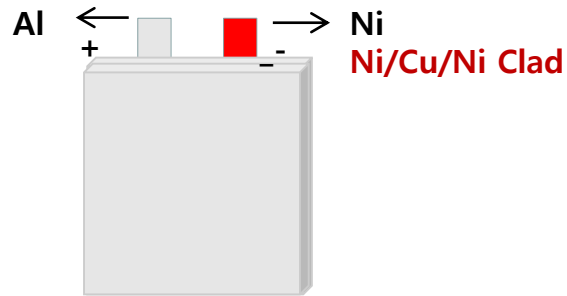
Secondary Battery Clad Lead Tap



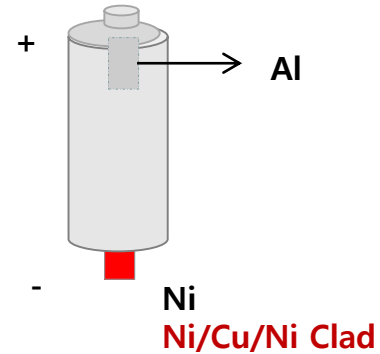
Make your future with
CSC's advanced materials



① Angular Can



② Cylindrical Can



1. Tolerance Control

Management of thickness deviation accurately by cold rolling experience over 20 years in cladding.

2. Slitting Technology

Minimize the tolerance of width & burr by accurate slitting & optimized process for Ultra thin materials

3. Homogeneous Heat Treatment

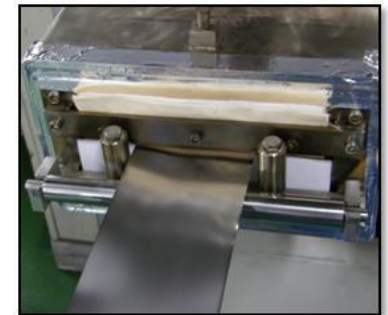
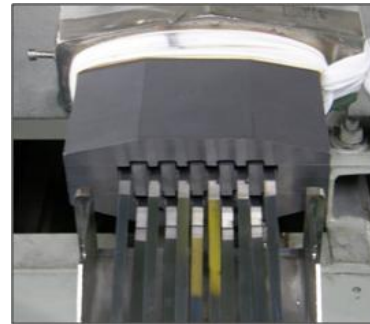
Homogenous quality by continuous Reel-to-Reel heat treatment

4. Foreign Substance Control

Near to Zero foreign substances by clean management

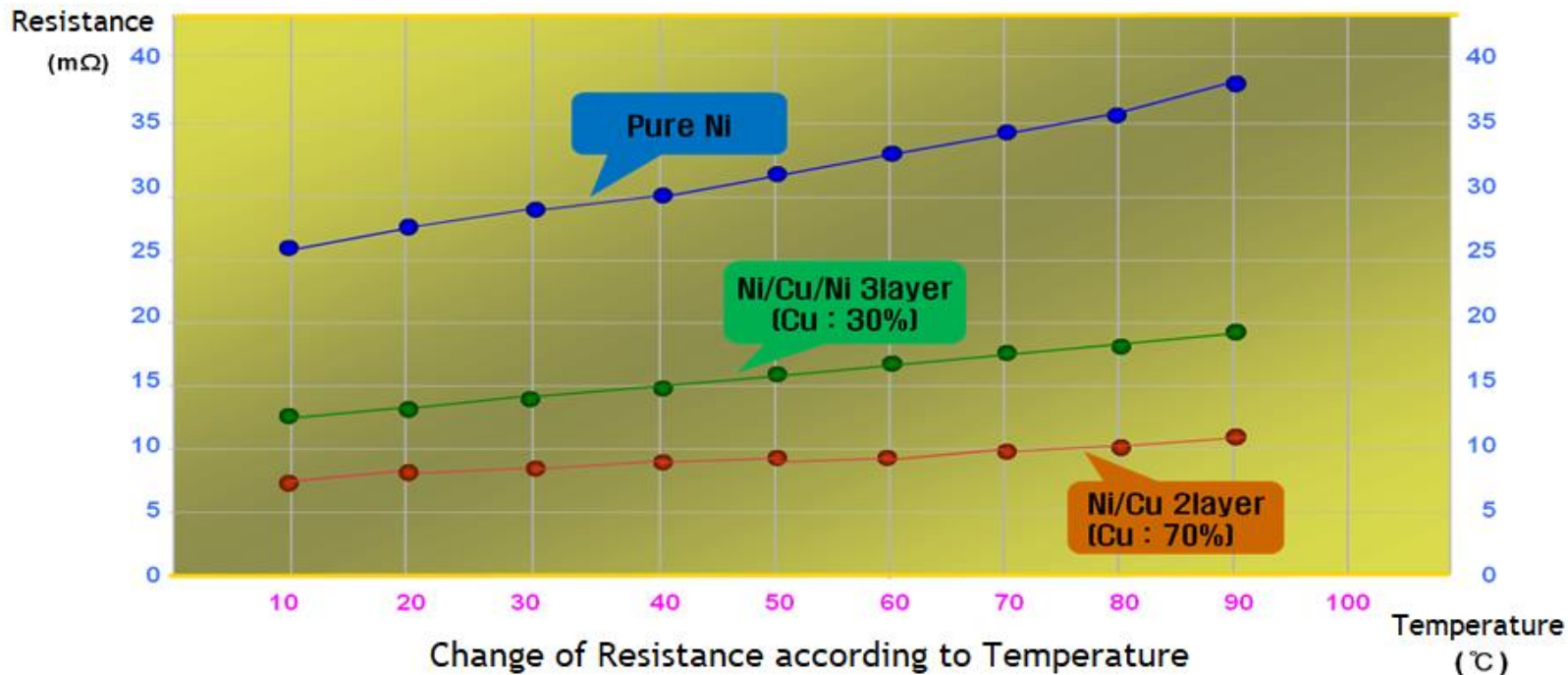
5. Cost Effective by Mass Production

Competitiveness by CAPA(Current CAPA: 50M Cell/month= 10ton/month)
No claim & Sales of 600M cell as of 2016



Lead Tap for Li-ion Battery(Can Type)

Lead tap has lower resistance and better thermal conductivity than Nickel tap which makes it better alternative for mobile devices, EV, power tool, and E-bike as they're requiring bigger batter capacity.



0.1t x 4.0w

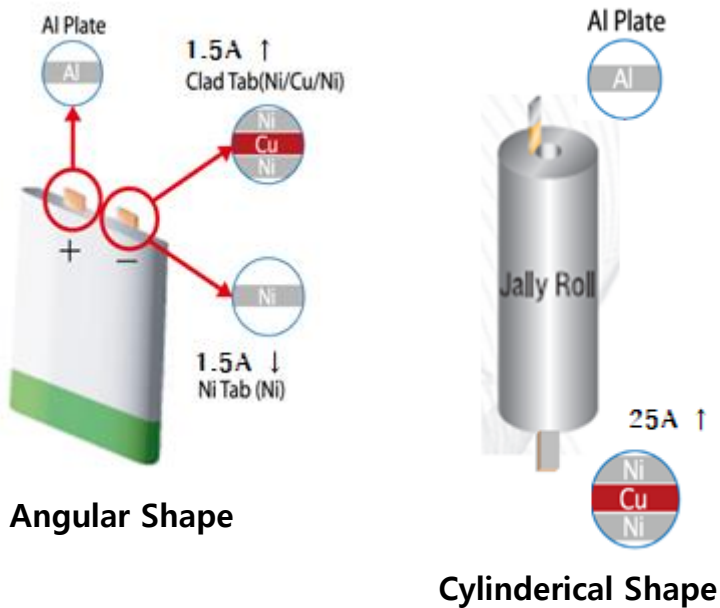
Component	Cu Ratio	Electrical Resistance ($\times 10^{-8} \Omega \cdot m$)	Weldability		
			Resistance welding	Laser welding	Ultrasonic welding
Ni/Cu	70%	2.0-2.2	Very Good	Good	Very Good
Ni/Cu/Ni	30%	4.0-4.2	Very Good	Good	Very Good

Lead Tap for Li-ion Battery(Can Type)

▶ Lineup of CSC Lead Tab

1. Product

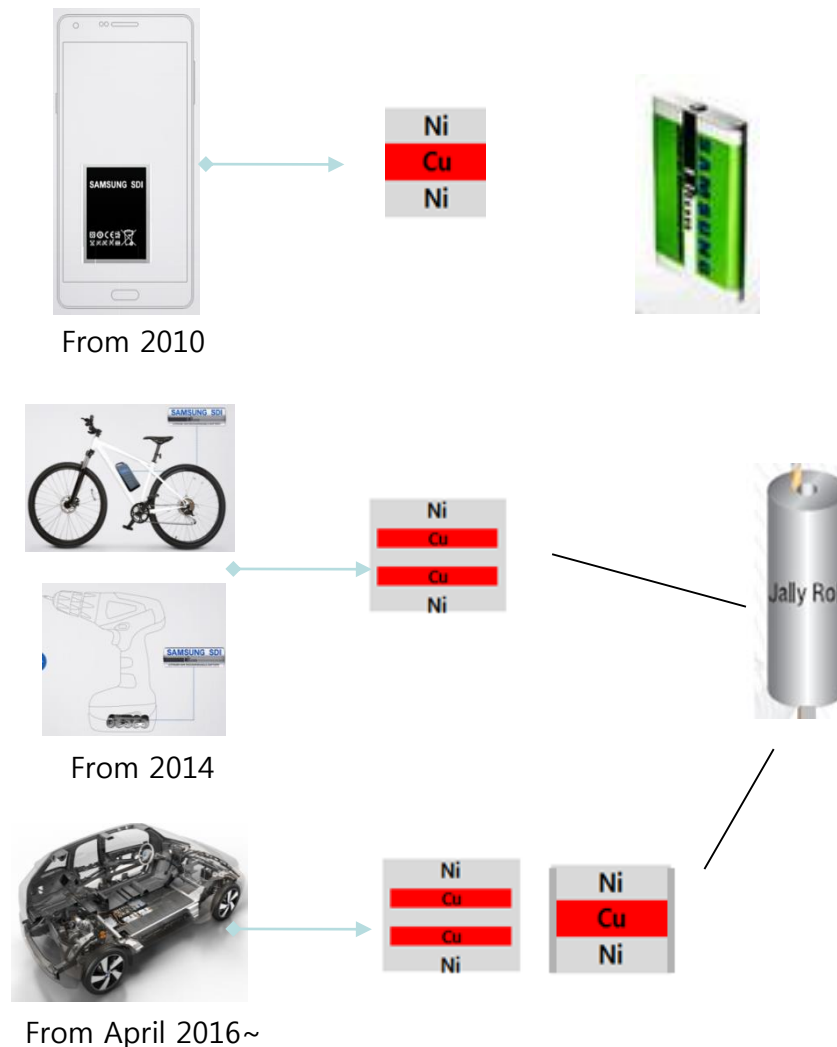
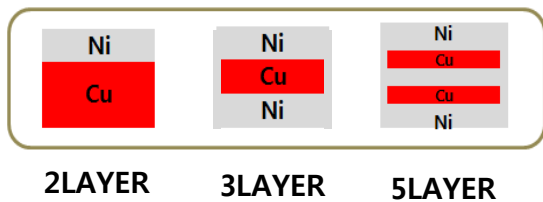
(1) Application



Angular Shape

Cylindrical Shape

(2) Type



Lead Tap for Li-ion Battery(Can Type)

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► Lineup of CSC Lead Tab

Type	Component	Layer	Size(mm)	Date of Invention	Note	Application
Angular	Ni/Cu/Ni (Cu30%)	3	0.10*3.0	May 2010	Mass Production	Smart Phone
	Ni/Cu/Ni (Cu30%)	3	0.10*4.0	Apr 2010	Mass Production	Smart Phone
	Ni/Cu/Ni (Cu30%)	3	0.08*4.0	Dec 2015	Thinner	Smart Phone
Cylindrical	Ni/Cu/Ni (Cu50%)	3	0.10*4.0	Jan 2016	Weldability, Low Resistance	Electric tools
	Ni/Cu/Ni/Cu/Ni +Ni Side Plating(Cu30%)	5	0.10*4.0	Dec 2014 Mar 2016	Ni Side Sealing -Δv Loss Protection	E-BIKE, Electric tools, EV
	Ni/Cu(30%)/Ni+Ni Plating	3	0.10*4.0	Jul 2016	Impurity Improvement	EV
	Ni/Cu (Cu40%)	2	0.10*4.0	Jun 2015	VE Model	E-BIKE, Electric tools
	Cu (Ni Plating/Cu)		0.10*4.0	Mar 2015 (Sep 2016)	Ultra Ductility (Hv 50) Chamfer, Plating	E-BIKE, Electric tools
	Cu (Ni Plating/Cu)		0.10*3.5	Mar 2015 (Sep 2016)	Ultra Ductility (Hv 50) Chamfer, Plating	E-BIKE, Electric tools

Lead Tap for Li-ion Battery(Can Type)

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► Manufacturing Process

1. Brushing



2. Cold Bonding



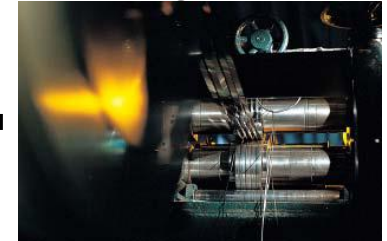
3. Annealing



4. Rolling



5. Slitting



6. Rewinding



7. Inspection



8. Packing



Technical data for CSC Clad Battery Tap

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Specification

Ni(0.035)/Cu(0.03)/Ni(0.035) Clad 0.1t x 4.0w

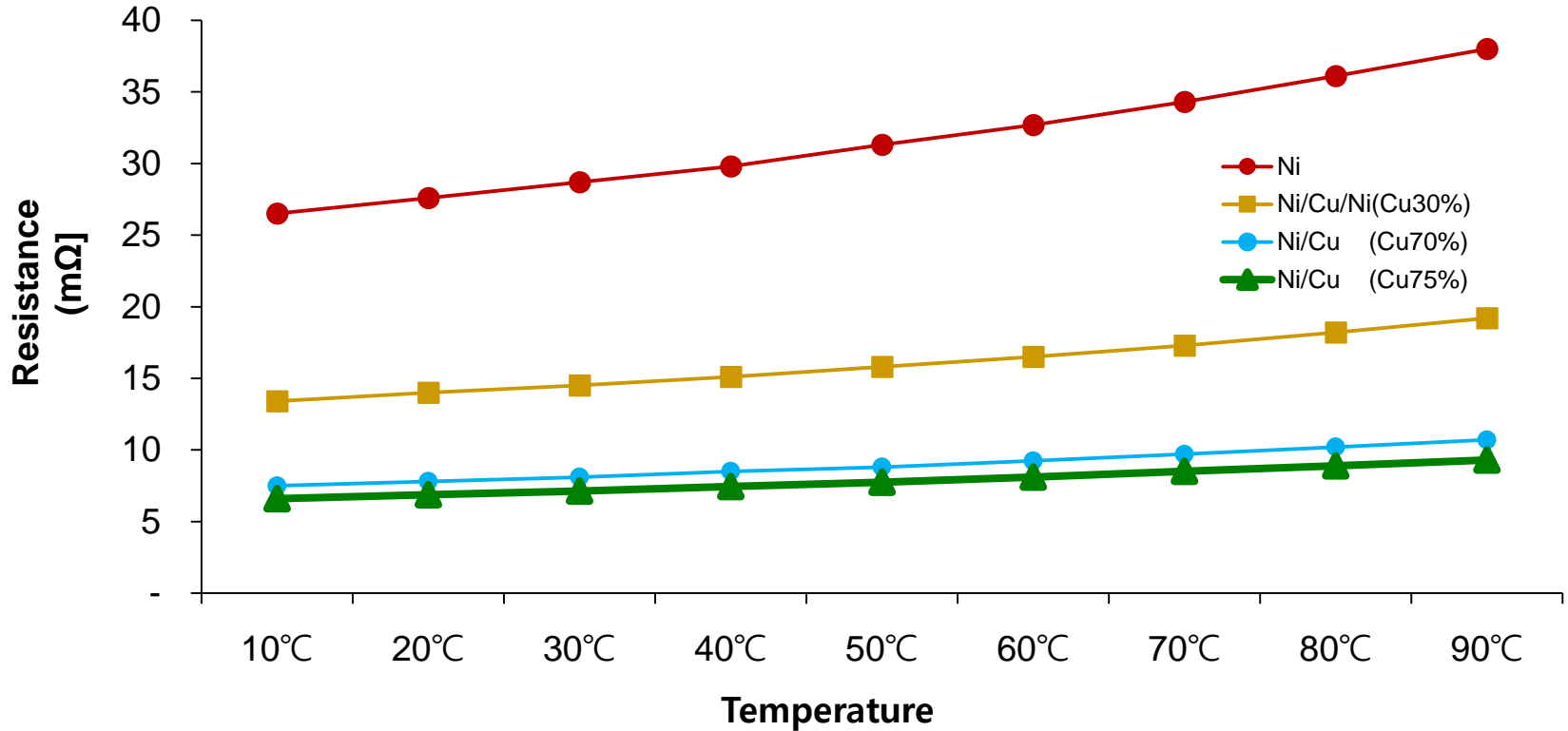
Item	Size(mm)					Characters	
	Total Thickness	Cu Thickness	Ni Thickness	Width	Burr	Resistance	Dyne Test
SPEC.	0.100 ±0.010mm	30±10μm	Bal.	4.0 ±0.1mm	0.010mm MAX	10.0±2.0mΩ	5 MIN
Max.	0.110	40	-	4.1	0.010	12.0	
Min.	0.090	20	-	3.9		8.0	5.0
Device	Micrometer	Image Analyzer	Micrometer	Caliper	Micrometer (Microscope)	HIOKI meter	Dyne test

Inspection	Mechanical Properties			Components (Ni)								Component (Cu)
	Tensile Strength	Elongation	Hv (Ni)	Ni+Co	Si	Mg	Cu	Fe	Mn	C	S	Cu
SPEC.	200 N/mm ² min.	5.0% Min.	85±15 HV	99.0%	0.3%	0.3%	0.2%	0.4%	0.3%	0.2%	0.01%	99.9MIN
Max.			100		0.3	0.3	0.2	0.4	0.3	0.2	0.01	
Min.	200.0	5.0	70	99.0								99.9
Device	UTM		Hv Tester	ICP								ICP

Technical data for CSC Clad Battery Tap

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■ Resistance





Materials	Dimensions (mm)	10°C	20°C	30°C	40°C	50°C	60°C	70°C	80°C	90°C
Ni	0.10*3	26.5	27.6	28.7	29.8	31.3	32.7	34.3	36.1	38.0
Ni/Cu/Ni (Cu30%)	0.10*3	13.4	14.0	14.5	15.1	15.8	16.5	17.3	18.2	19.2
Ni/Cu (Cu70%)	0.10*3	7.5	7.8	8.1	8.5	8.8	9.2	9.7	10.2	10.7
Ni/Cu (Cu75%)	0.08*4	6.6	6.8	7.1	7.4	7.8	8.1	8.5	8.9	9.4

Technical data for CSC Clad Battery Tap

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■ Measurement of Surface Tension

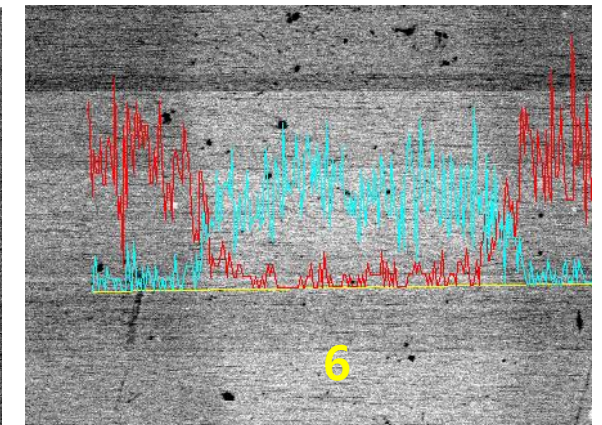
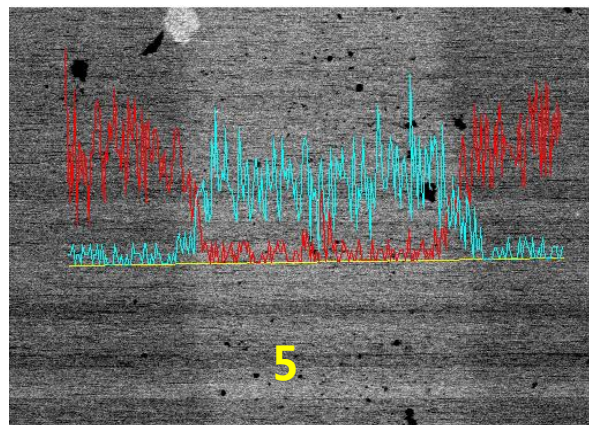
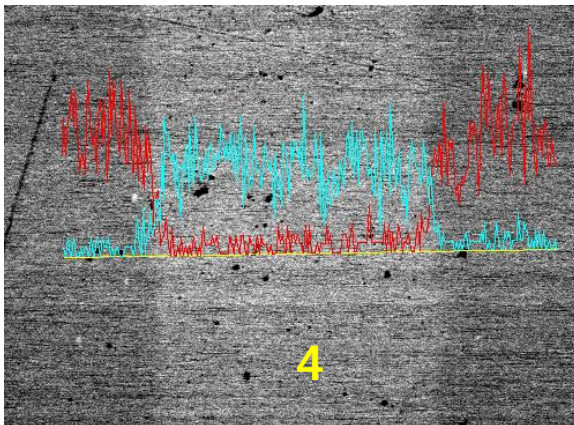
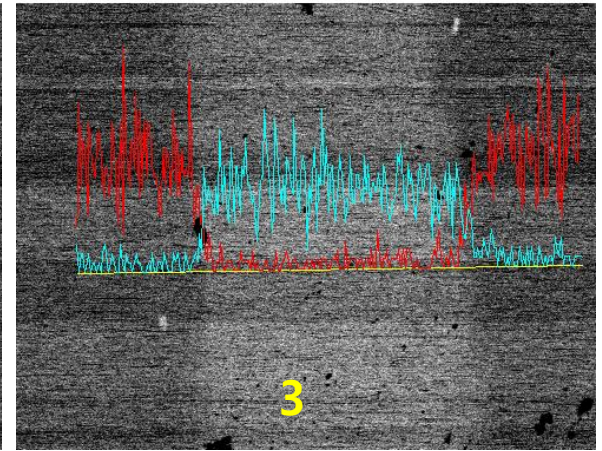
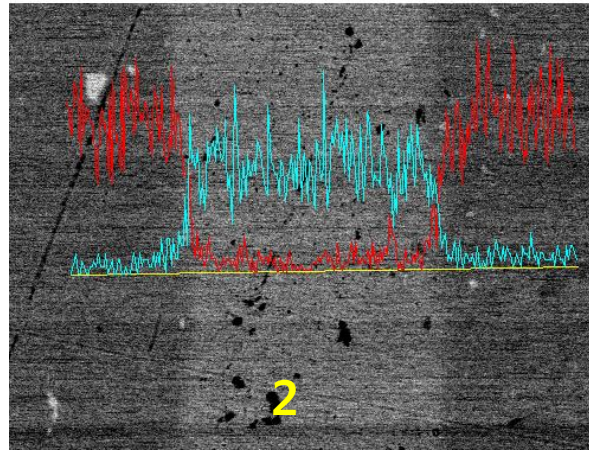
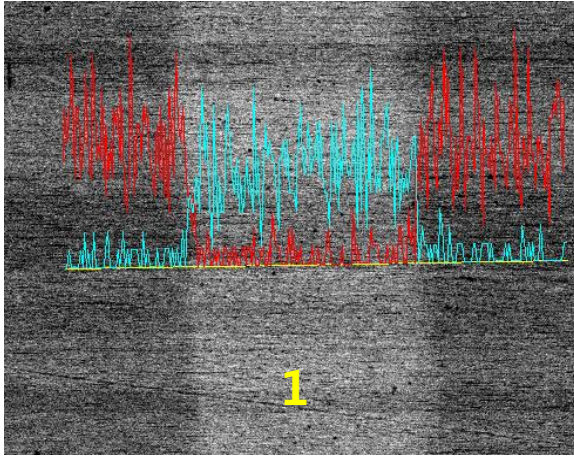
	NG
	PASS

Formamide (%)	2-Ethoxyethanol (%)	Surface Tension (Dyne)
19.0	81.0	33

• Criterion

- ① Spread solution and check the liquid surface condition
- ② Maintain the initial condition for 60 seconds

■ Diffusion layer of Ni/Cu/Ni Boundary



Ni/Cu/Ni Change of level of diffusion according to heat treatment temperature and time

(The bigger number on the pictures means higher temperature and longer time.)

Technical data for CSC Clad Battery Tap

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RoHS

Test Report No. F690501/LF-CTSA YAA10-05482

Issued Date: February 19, 2010

Page 2 of 4

Sample No. : AYAA10-05482.001
Sample Description : Ni/C1100/Ni
Item No./Part No. : Clad Tab
Comments : Materials are Ni/C1100/Ni.

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP	2	N.D.
Hexavalent Chromium (Cr VI) By boiling water extraction*	**	With reference to IEC 62321:2008	-	Negative

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.

SGS

SGS Testing Korea Co. Ltd.

Jeff Jang

Jeff Jang / Chemical Lab Mgr

Technical data for CSC Clad Battery Tap

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■ Packaging



[Inner Packaging]



[Outer Packaging]



A4500761063003L0341

Mat	SJ71-00183A	Unit	M
Spec	NI201,C1100,T0.1		
Qty	798	Vendor	창성
Prod.Lot	11.09.26	O110903	



A4500761063003B0173

Mat	SJ71-00183A	Unit	M
Spec	NI201,C1100,T0.1		
Qty	1593	Vendor	창성
Prod.Lot	11.09.26	O110903	

SAMSUNG SDI



LG Chem

Panasonic

muRata

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