

Le stockage d'énergie

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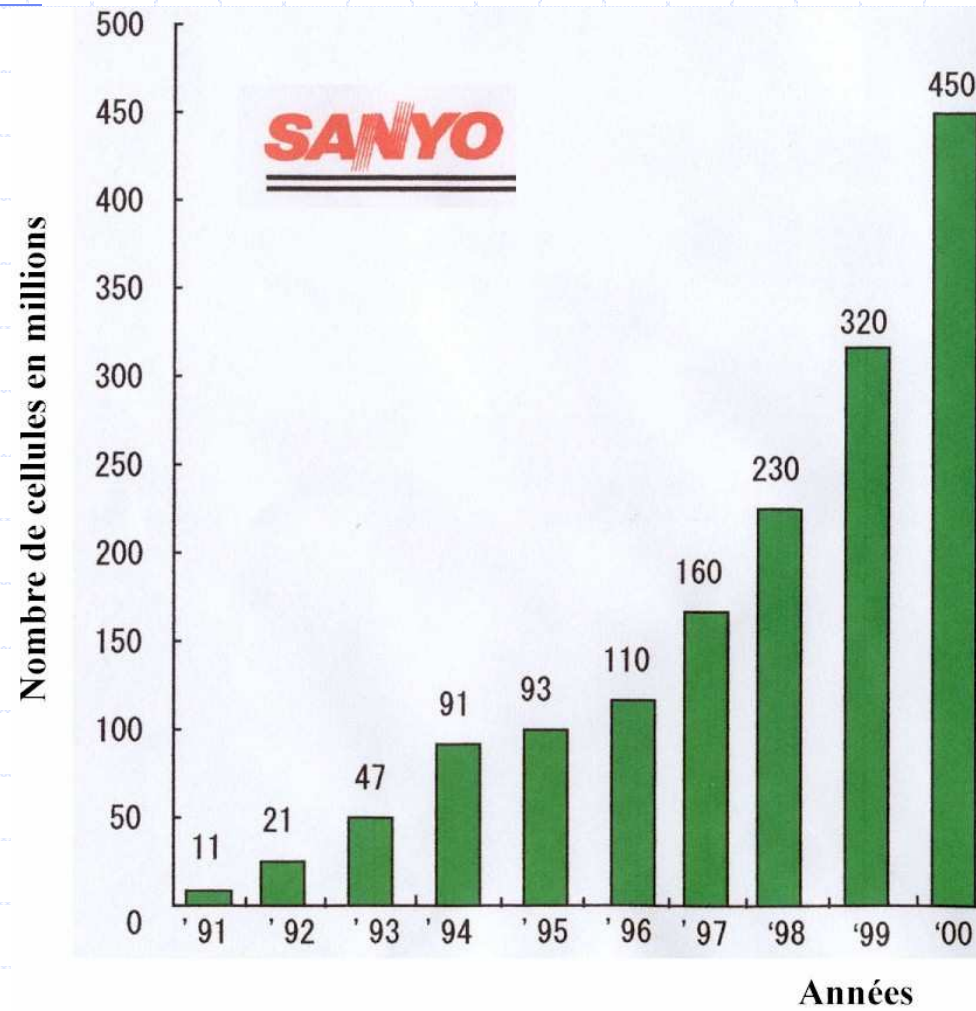
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Sommaire

- ◆ Introduction
- ◆ Généralités
- ◆ La technologie Ni MH
- ◆ La technologie Lithium Ion
- ◆ Les technologies innovantes
- ◆ Conclusion

Production de batteries Ni MH de SANYO

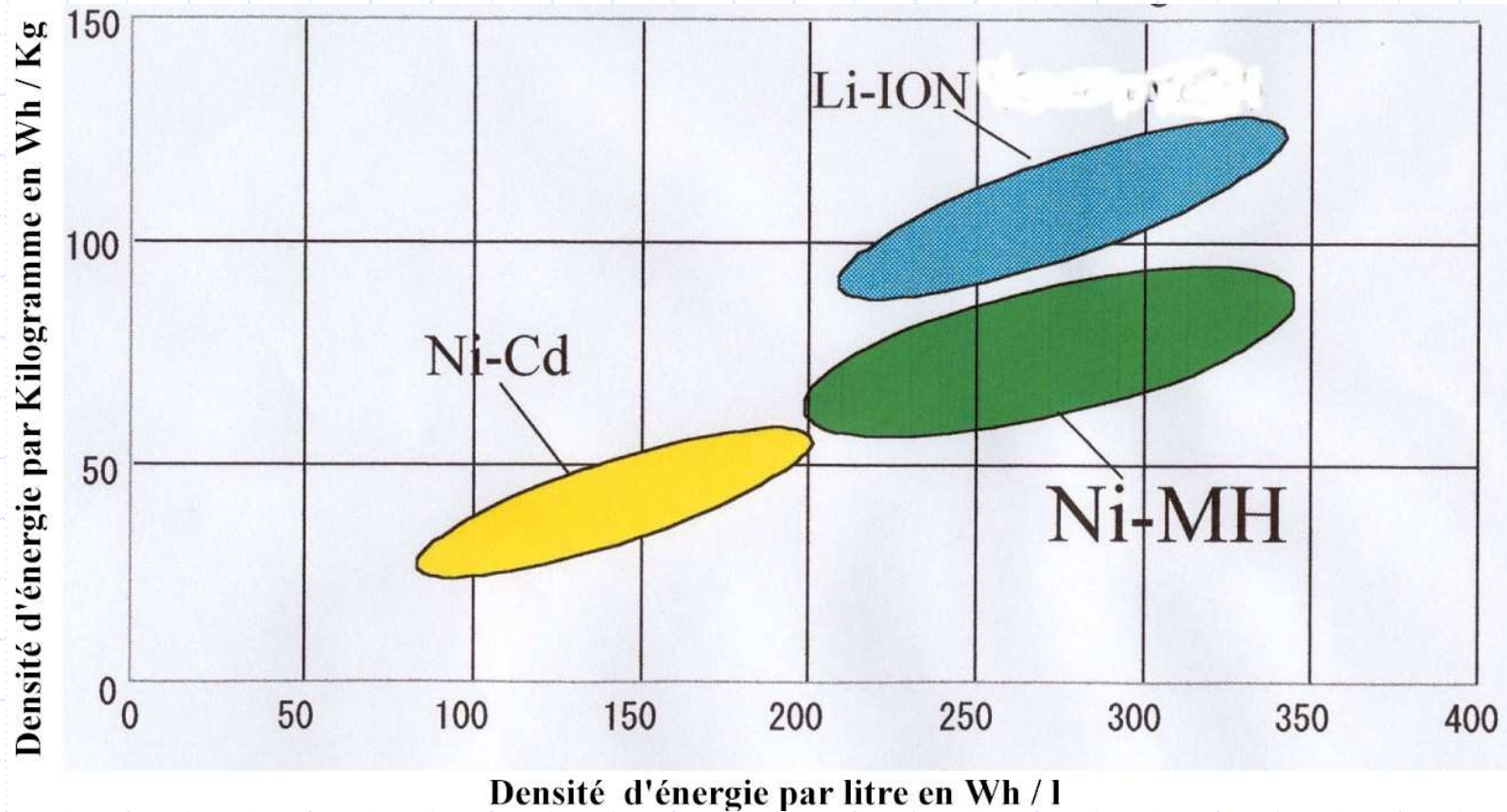


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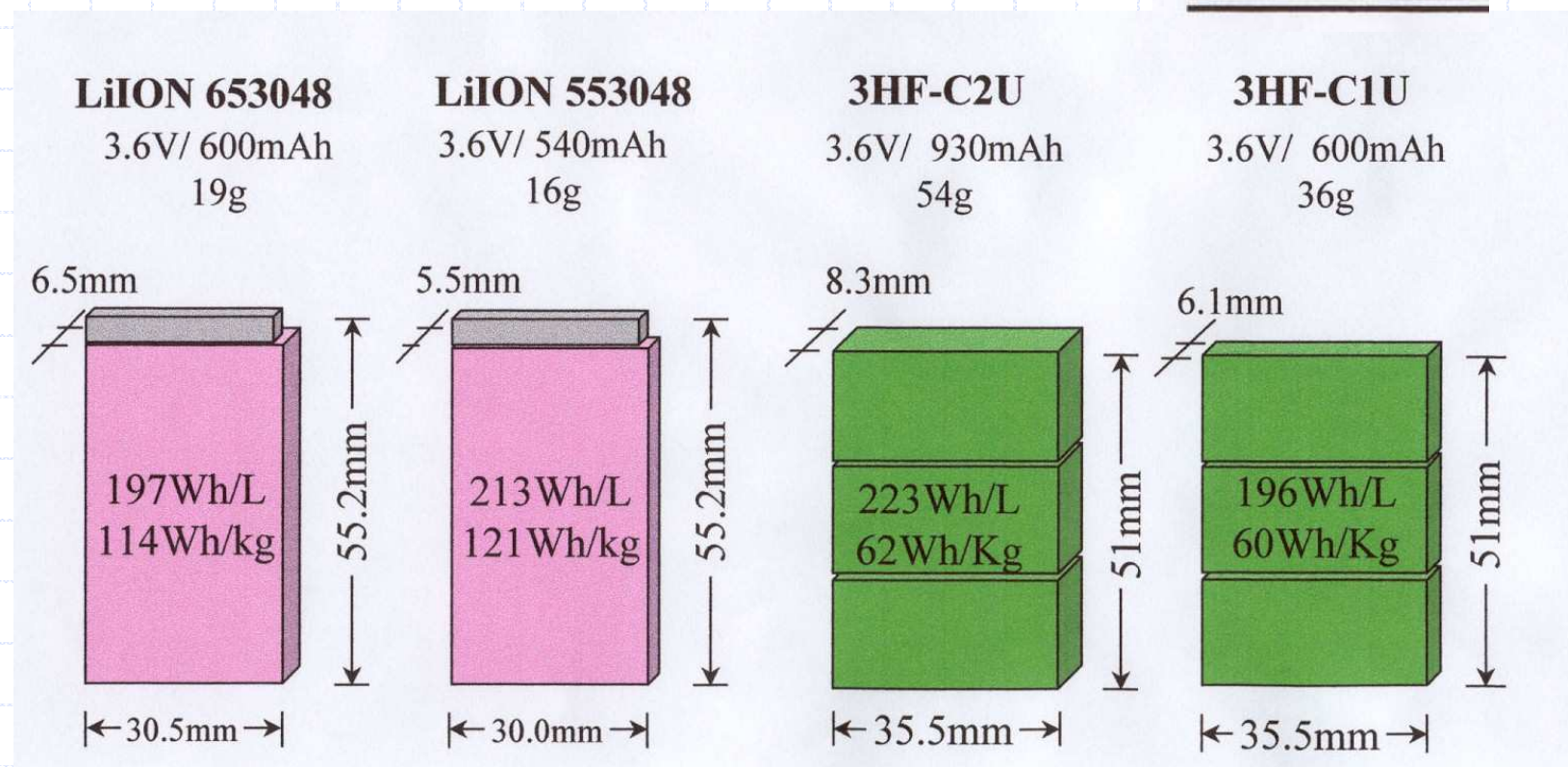


Comparaison de différents types de batteries



Comparaison entre la technologie Ni MH et Lithium Ion

SANYO



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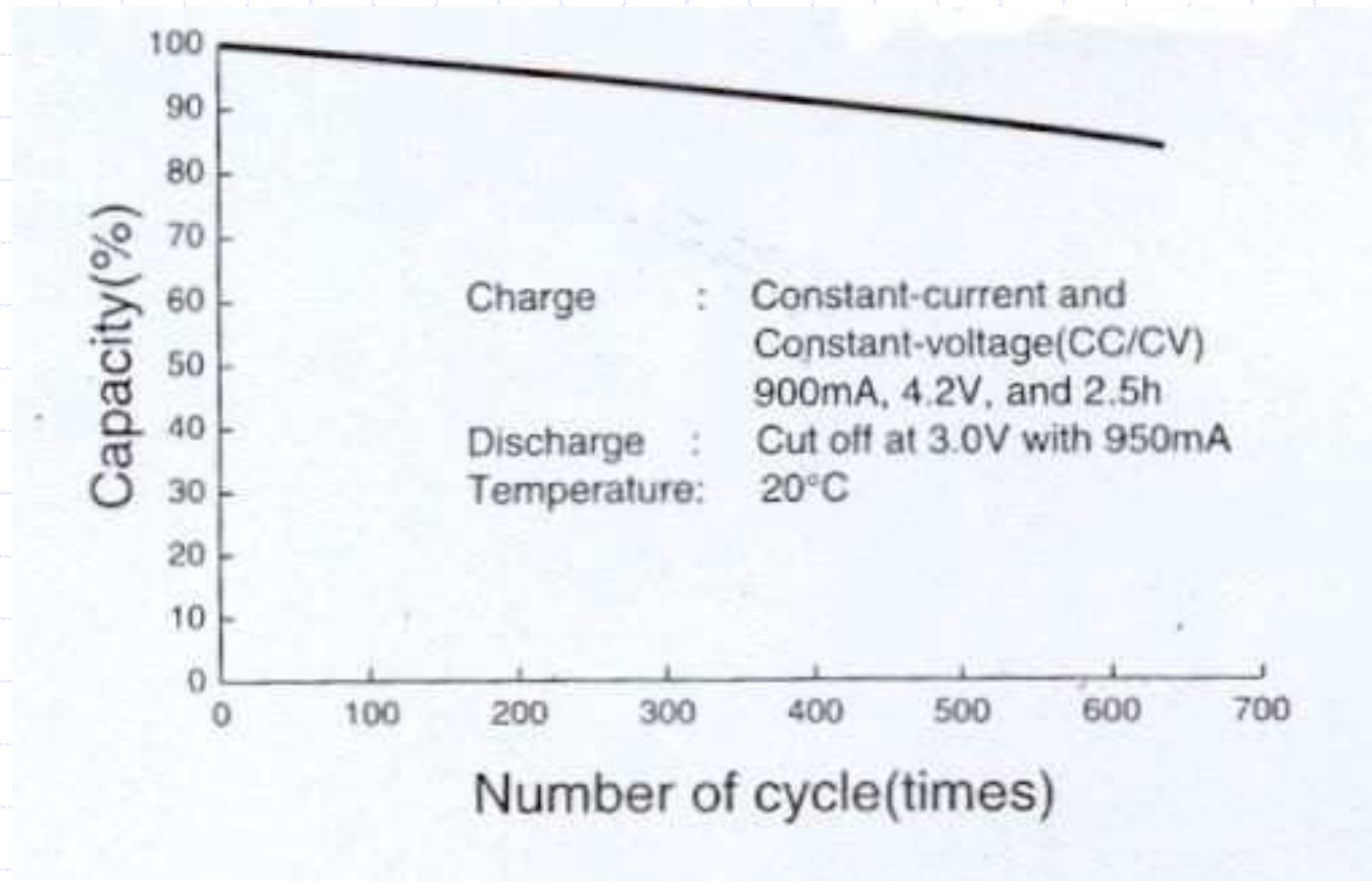
CNRS

INSIS

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RENNES I

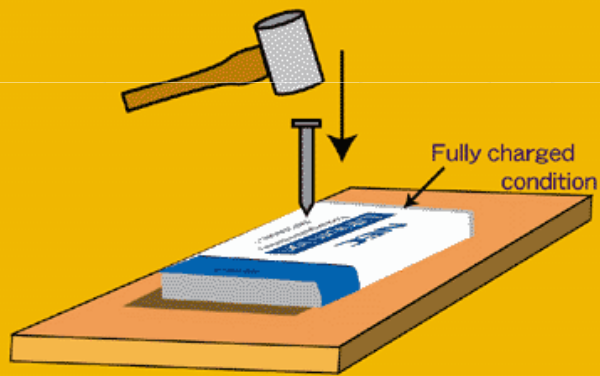
Variation de la capacité en fonction des cycles (Li ion)



Test de sécurité 1

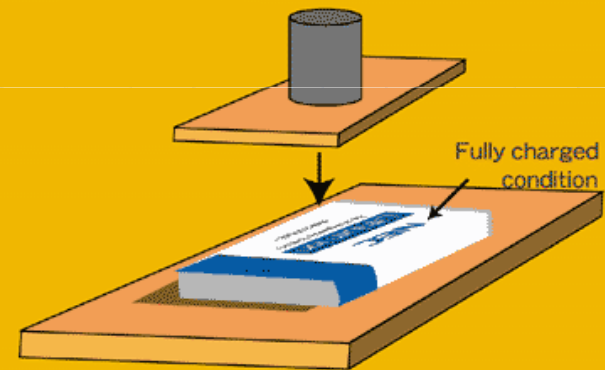
◆ Nail Penetration Test

Simulation test when an internal short circuit occurs.



◆ Crush Test

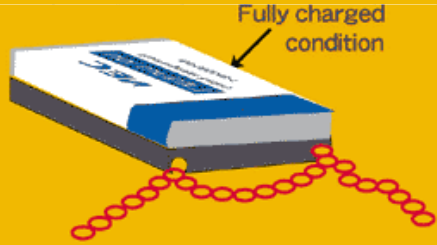
Test on the assumption that a discarded battery is crushed by a garbage truck or the like.



Test de sécurité 2

◆ Short Circuit Test

Test on the assumption that a short circuit is caused by a chain of a necklace in a bag

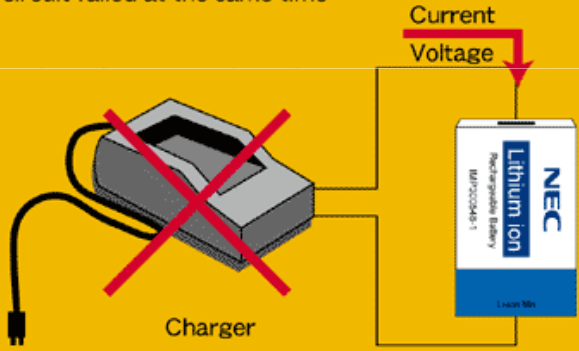


Fully charged condition

The diagram shows a rectangular battery pack with a blue top and a grey bottom. A red chain of circular links is draped over the battery, with its ends touching the positive and negative terminals, creating a short circuit. An arrow points to the top of the battery with the text 'Fully charged condition'.

◆ Over Charge Test

Test on the assumption that a charger and a control circuit failed at the same time

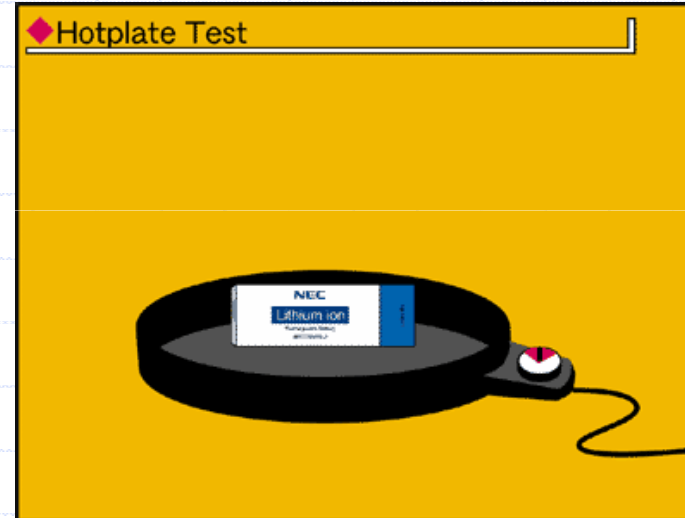
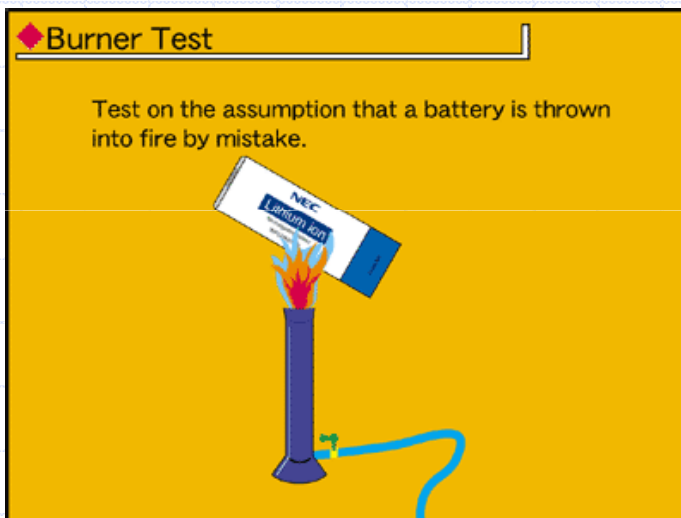


Current
Voltage

Charger

The diagram shows a grey rectangular charger with a black cable plugged into it. A red 'X' is drawn over the charger. To the right, a blue and white NEC Lithium Ion Rechargeable Battery is connected to the charger. A red arrow labeled 'Current' points from the charger to the battery, and another red arrow labeled 'Voltage' points from the battery back to the charger.

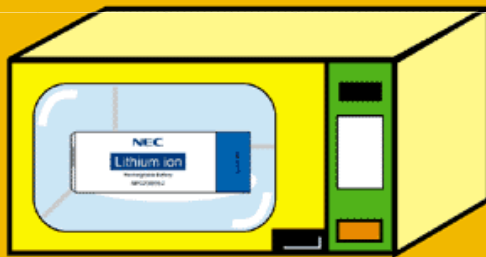
Test de sécurité 3



Test de sécurité 4

◆ Microwave Test

Test on the assumption that a child acted mischievously with a battery.

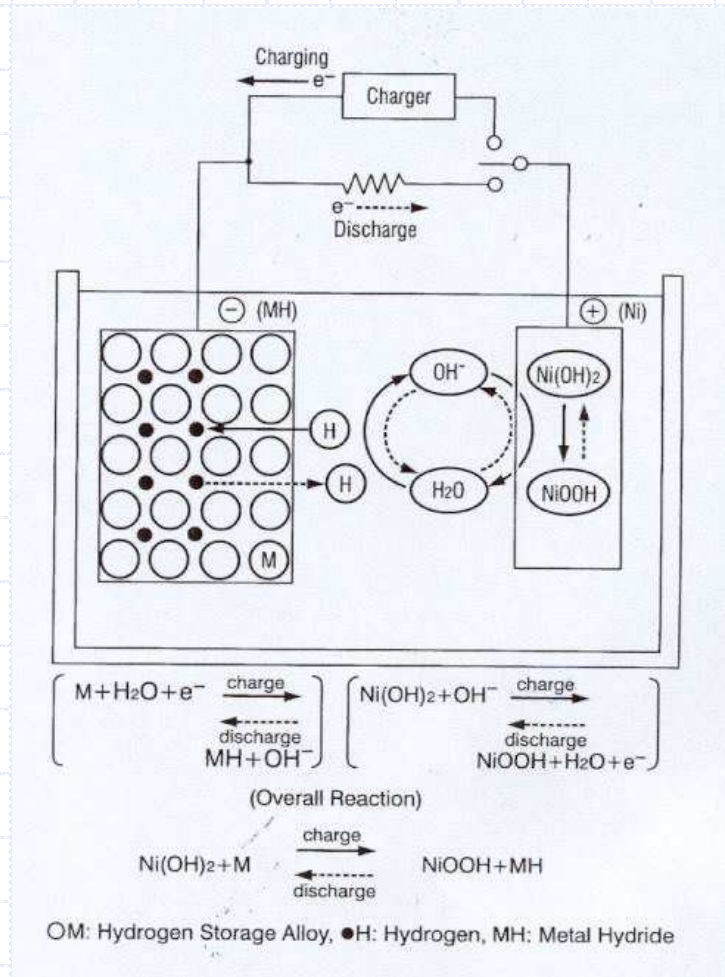


◆ Hot Oil Drop

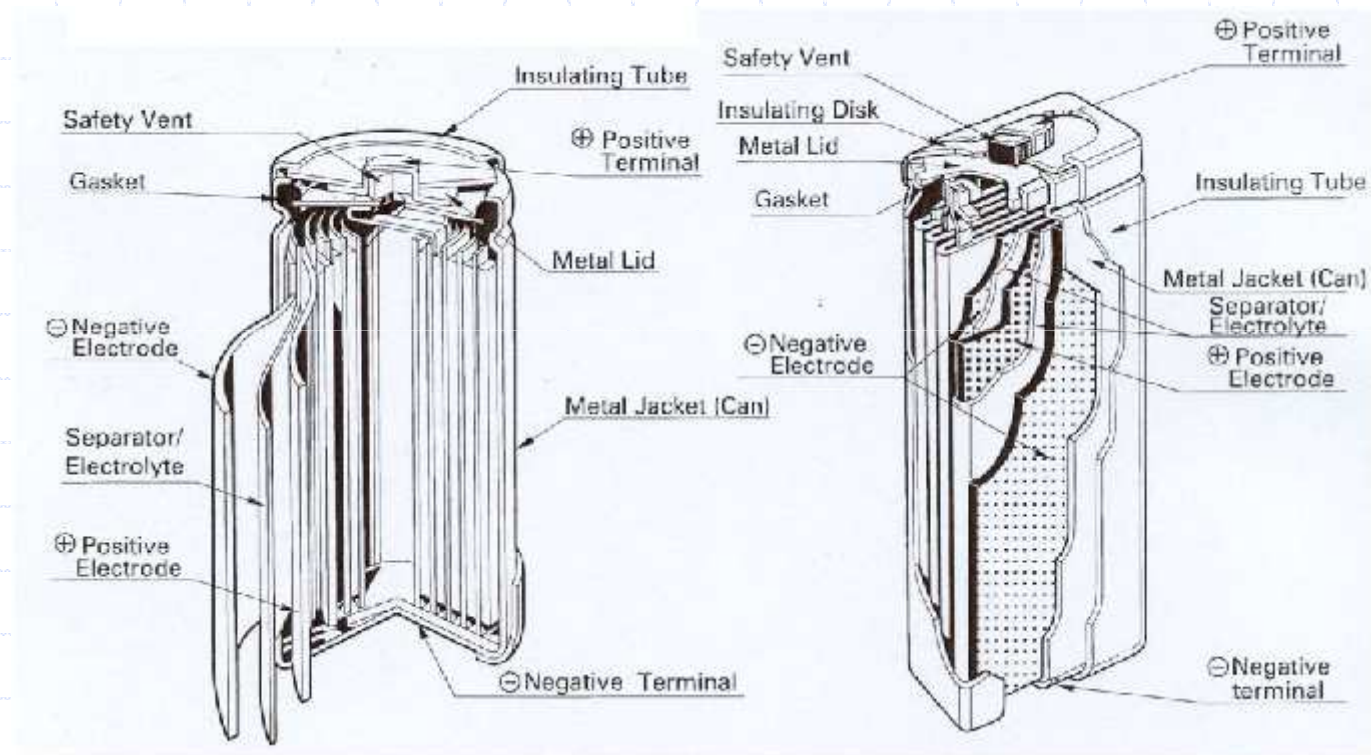
Test on the assumption that a battery is dropped into hot oil by mistake.



Les batteries Ni MH

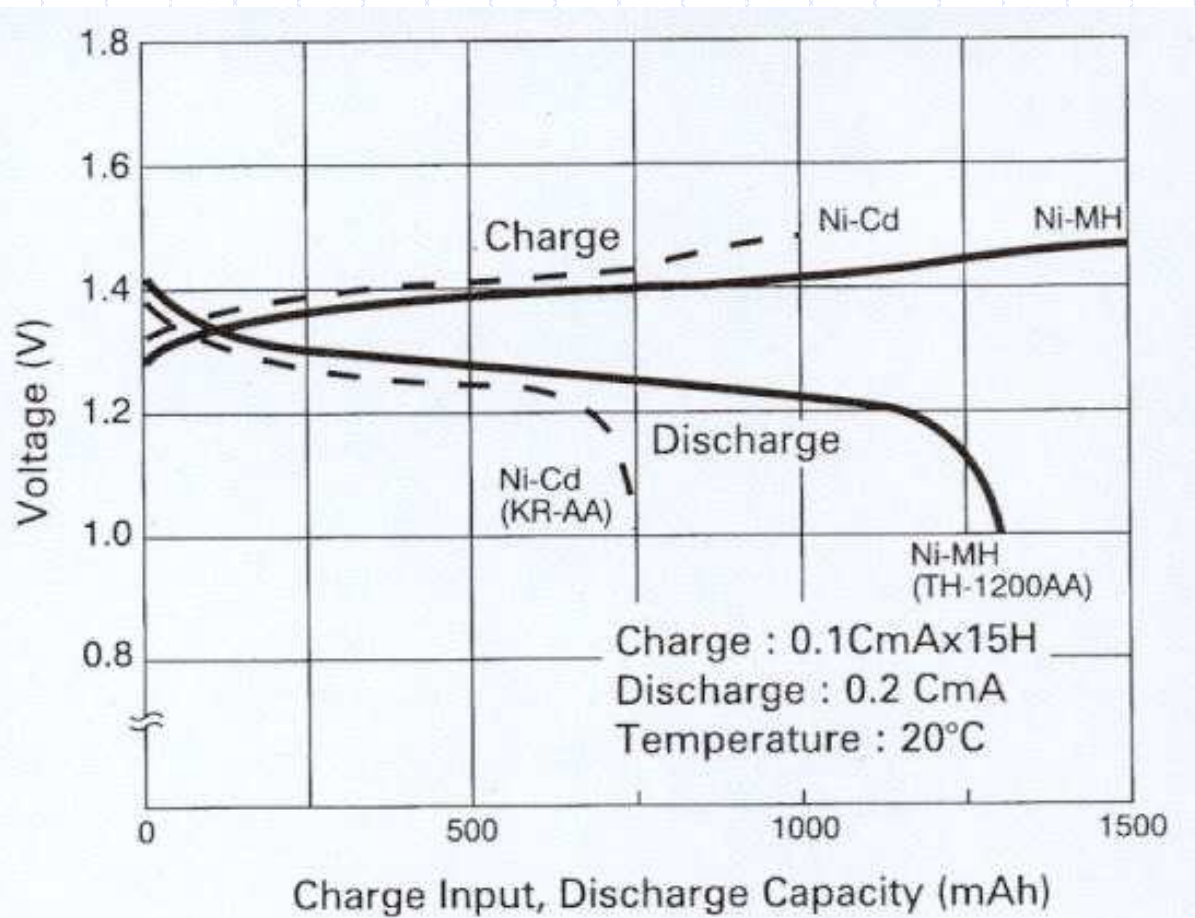


Les batteries Ni MH

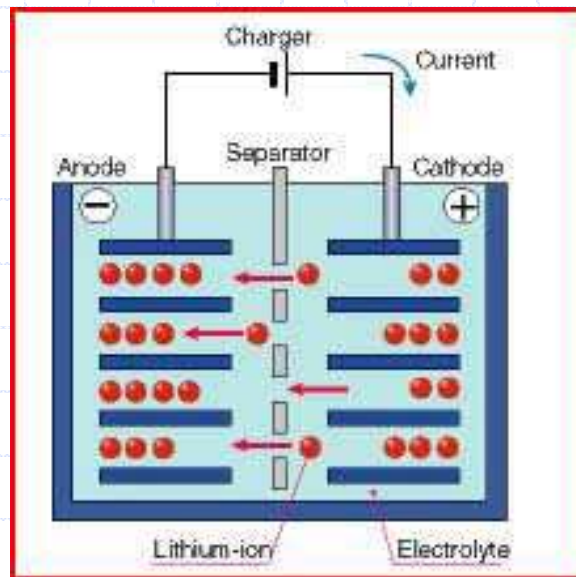


Les batteries Ni MH

Les cycles de charge et décharge



Les batteries Lithium ion



Charge

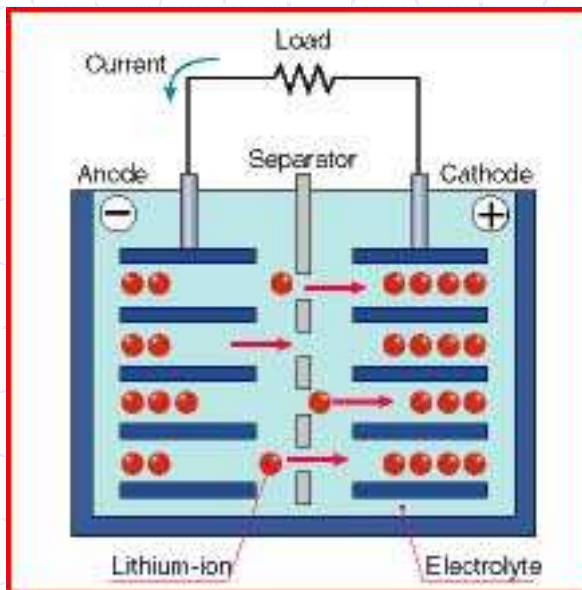
Cobalt type:



Manganèse type:



Les batteries Lithium ion



Décharge

Cobalt type:

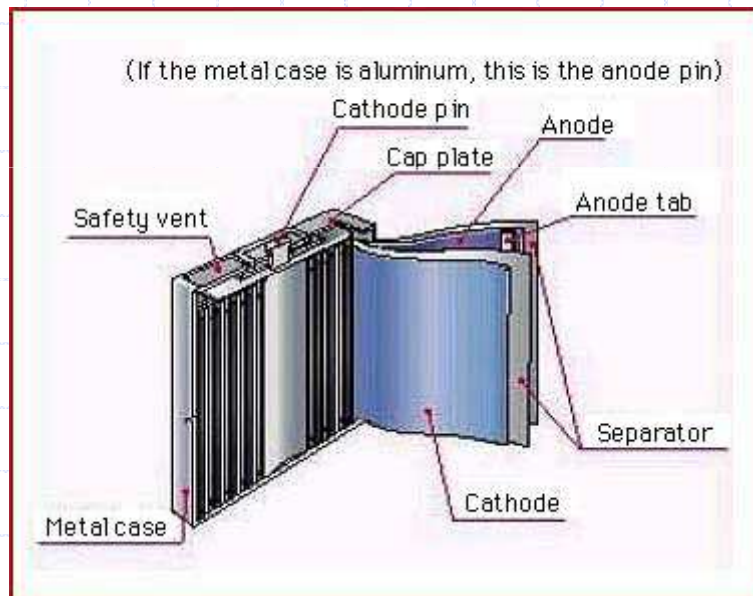


Manganese type:

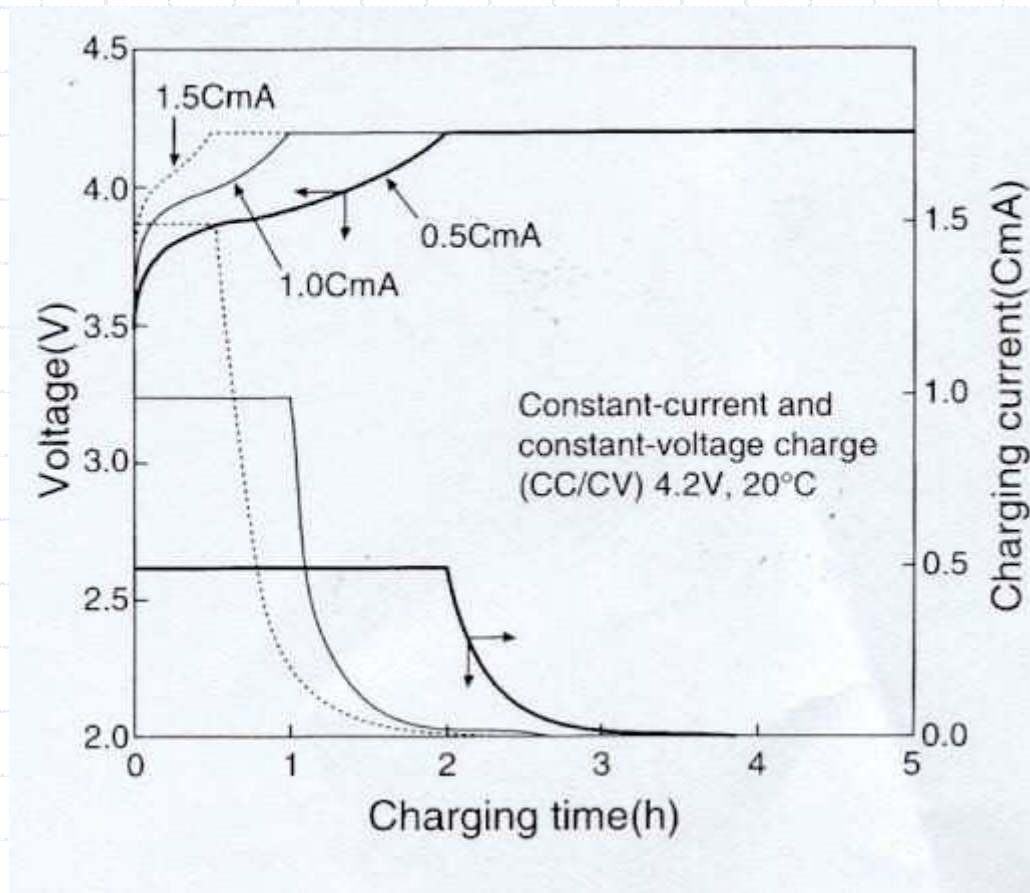


Les batteries Lithium ion

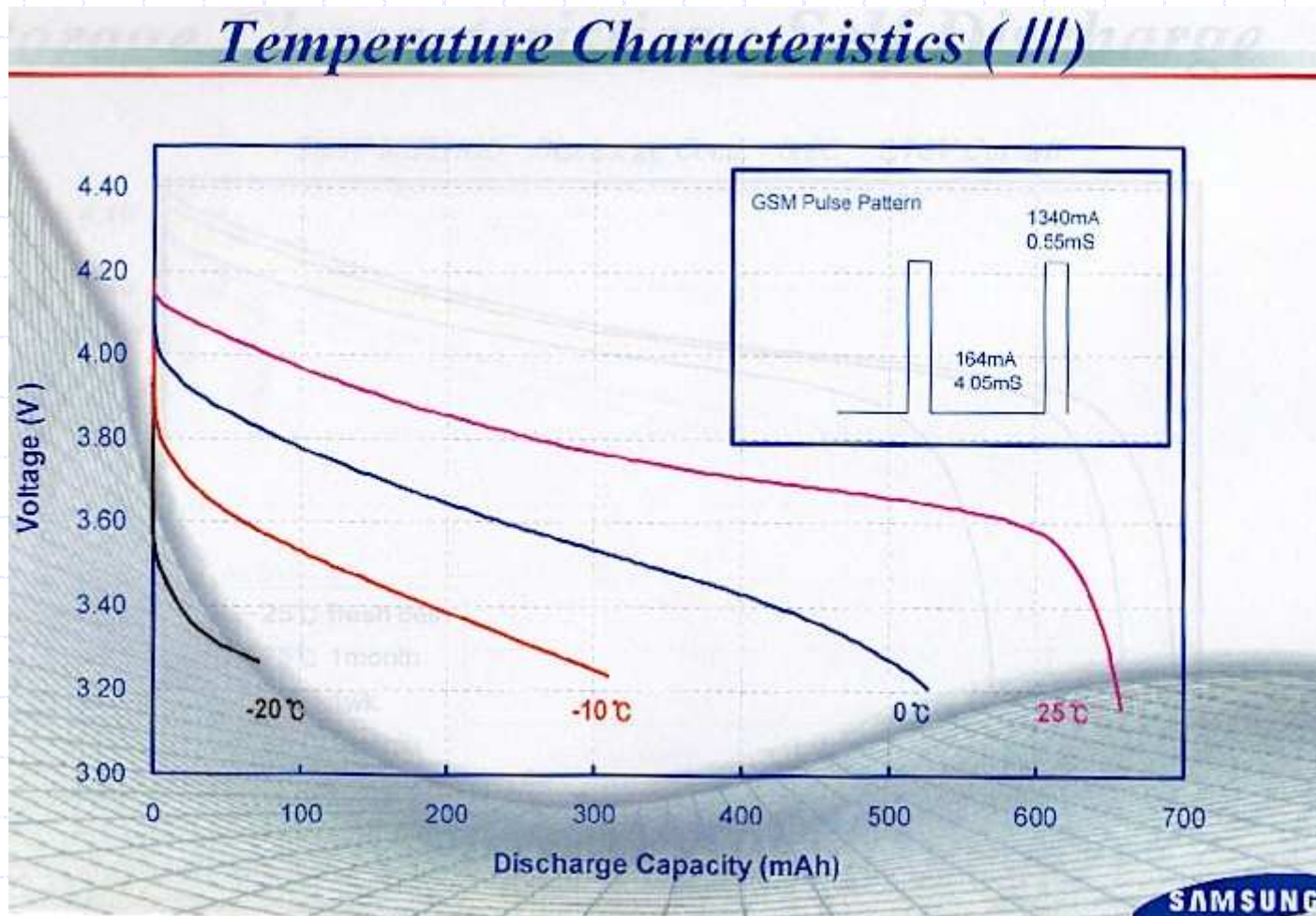
Structure (cellule parallélepédique)



Les batteries Lithium ion cycle de charge



Les batteries Lithium ion capacité en fonction de T°



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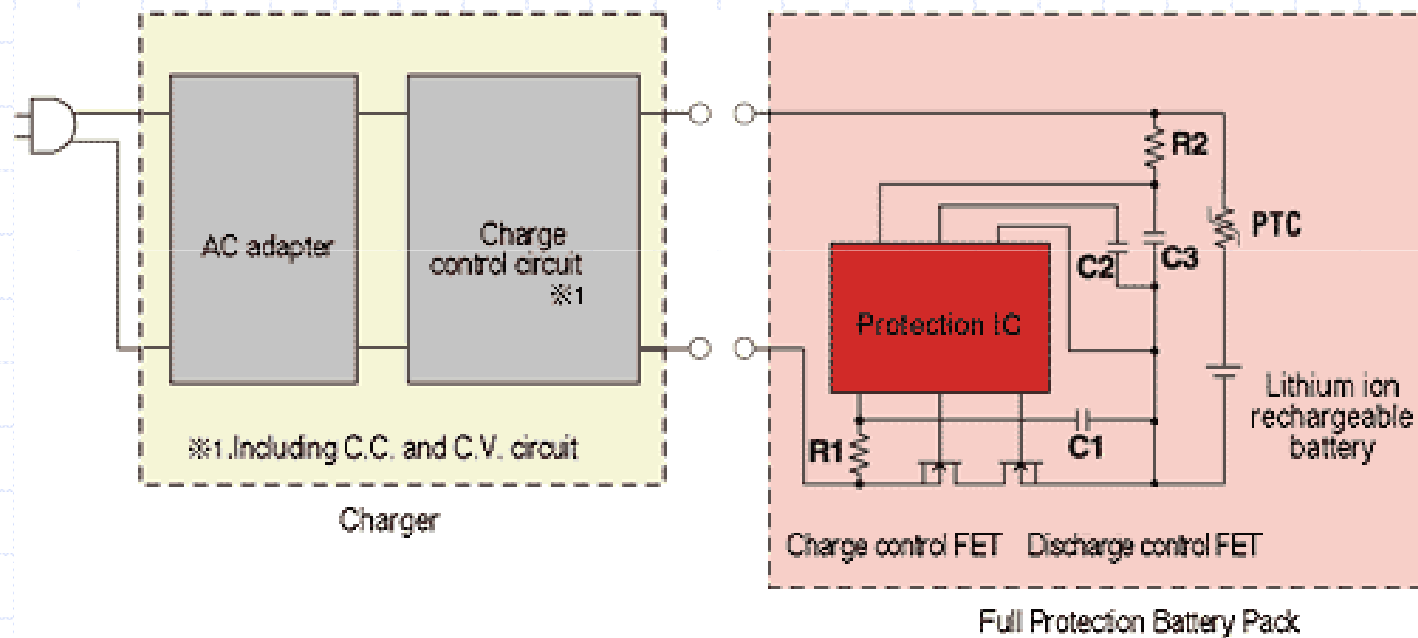
CRS

INSA

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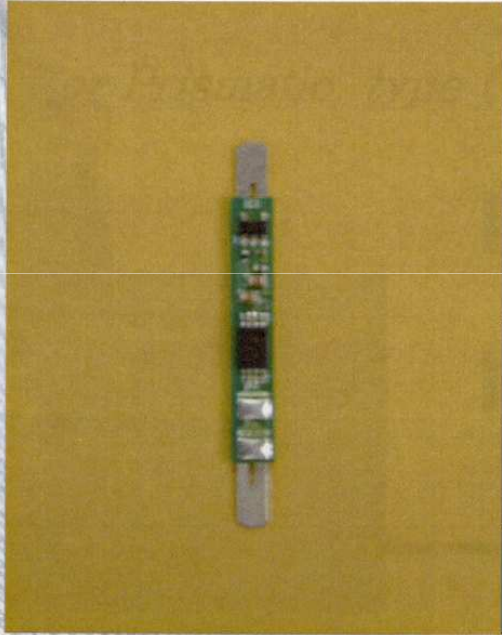
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Les batteries Lithium ion circuit de protection




Les batteries Lithium ion circuit de protection

Battery Protection Module



<i>Overcharge Protection</i>	$4.325 \pm 0.025V$
<i>Overcharge Release</i>	$4.075 \pm 0.05V$
<i>Over discharge Protection</i>	$2.5 \pm 0.08V$
<i>Over discharge Release</i>	$2.9 \pm 0.1V$
<i>Over current Protection</i>	$3.3 \pm 0.4A$
<i>Operating Current</i>	$6.0 \mu A$



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Les batteries Lithium Ion Polymère

Les avantages

- ◆ Une forme malléable
- ◆ Une grande capacité
- ◆ Un volume et un poids faible
- ◆ La batterie peut être très fine
- ◆ Un produit sûr
- ◆ Une durée de vie importante

Les batteries Lithium Ion Polymère

Les inconvénients

- ◆ Un coût plus important
- ◆ La diminution de la capacité à basse température
- ◆ Le stockage



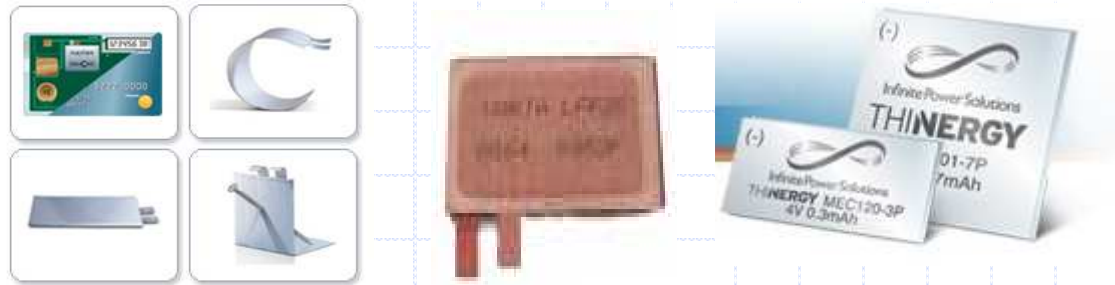
Les Technologies innovantes

Énergie (Piles)



Piles plates

- Piles lithium (Solcore, Varta, Infinite Power Solutions)



- Piles zinc / Manganèse (enfucell, Powerpaper, Prelonic)



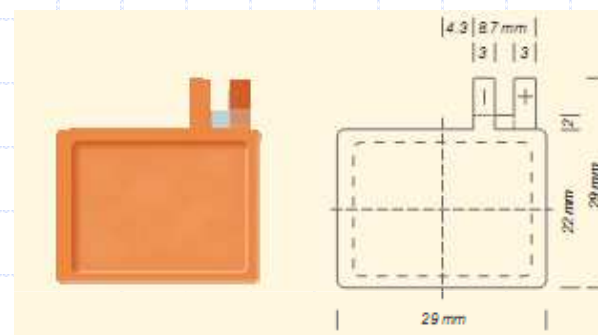
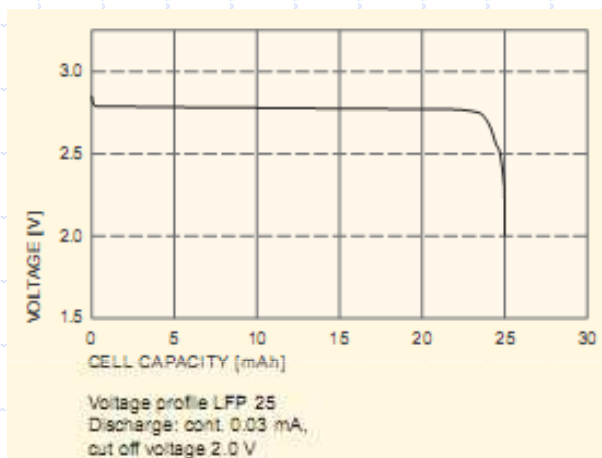
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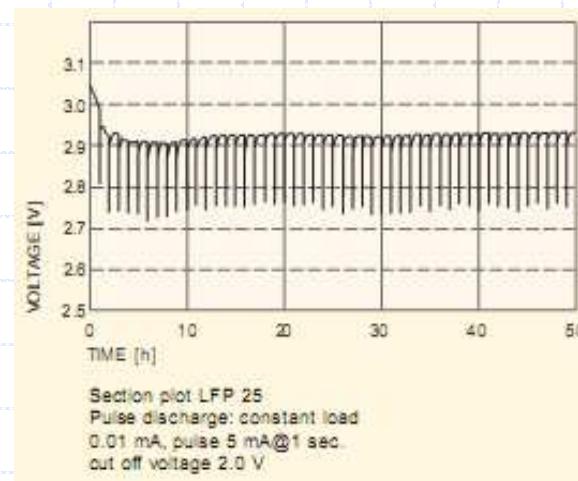
(Piles Lithium)

◆ Exemple de la pile Varta LFP25



Solicore
Varta
Infinite Power Solutions
Ultralife
Frontend Technology
Rocket
NanoEner

OAK Ridge
Microenergy
Excellatron
Ocell Technology
Powerstream
Intellikraft



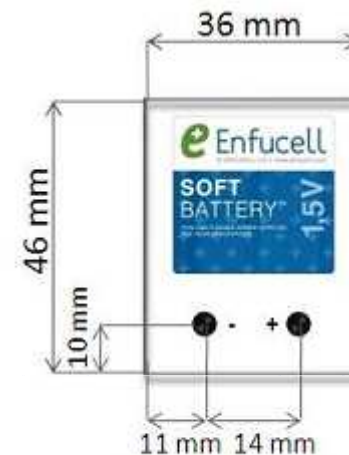
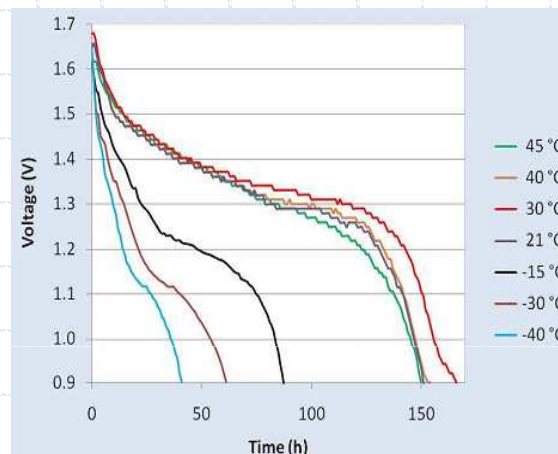
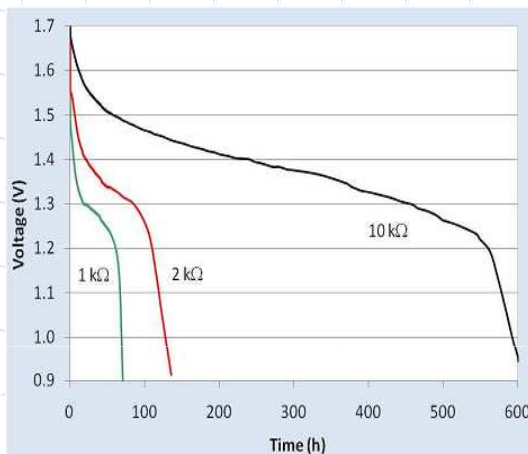
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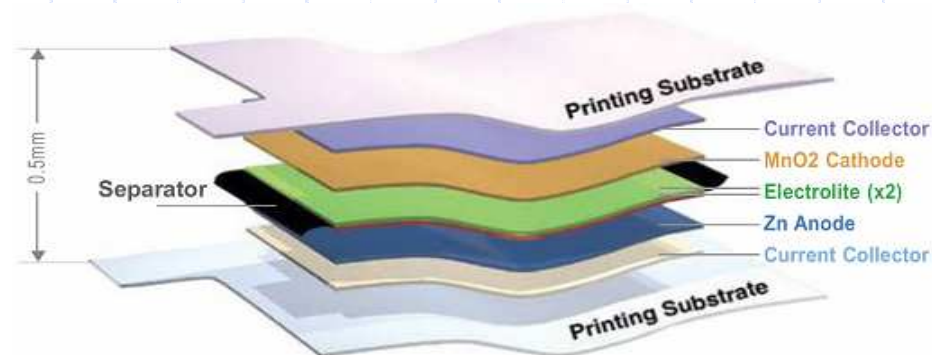


(pile Zinc / Manganese)

◆ Exemple de la pile Enfucell



Power Paper,
Thin Battery Technology,
Enfucell,
Graphic Solutions Incorporated
Prelonic
Blue Spark technologies



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(Piles du futur)

Rensselaer Polytechnic Institute (US)

- 90% cellulose et 10% nanotubes de carbone
- Pile ou Supercondensateur
- Eau, sang, salive, urine, vodka.....



Pile NOPOPO (Aqua power system)

- Pile Carbone / Magnesium
- Fonctionne avec n'importe quel liquide



Uppsala University (Suède)

- Pile cellulose, algue verte et sel....



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(Piles du futur)

◆ **Institute of Bioengineering and Nanotechnology (IBN) in Singapore:**

◆ « Urine-activated paper battery »

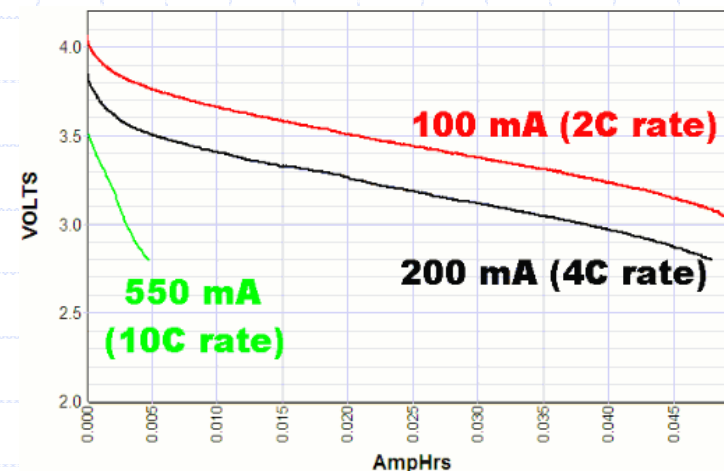
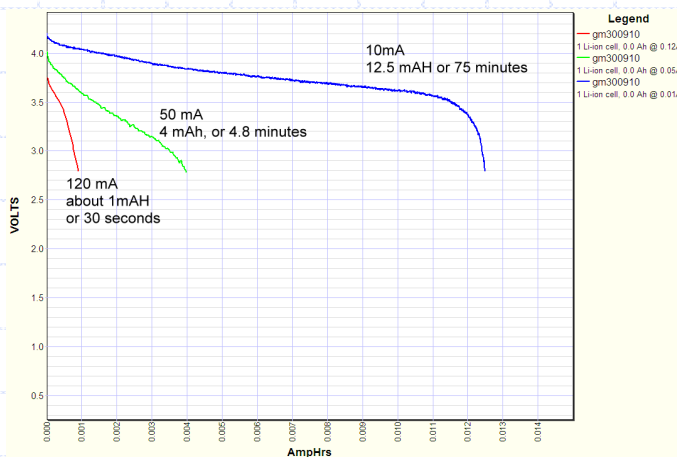
- Une pile qui alimente des test Biologiques
 - ◆ Analyse d'Urine
 - ◆ Diabete
 - ◆ Etc....



(Batteries rechargeable lithium)

◆ Exemple de POWER Stream:

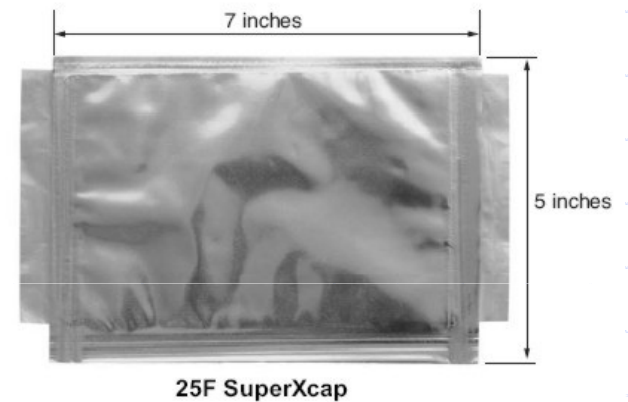
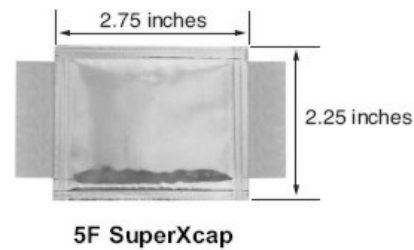
Solicore
 Varta
 Infinite Power Solutions
 Ultralife
 Frontend Technology
 OAK Ridge
 Microenergy
 Excellatron
 Ocell Technology
 Powerstream



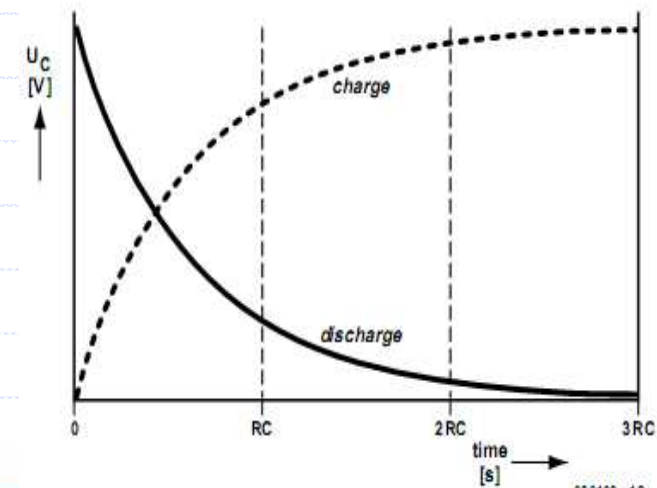
Discharge Curves for 00504050 55 mAH Ultra thin Cell

(Supercapacités)

OptiXtal



PRODUCT NUMBER	SuperXcap 5F	SuperXcap 25F
Product Description	Single, flat, stackable cell	Single, flat, stackable cell
Connections	Ultrasonic welding	Ultrasonic welding
Packaging	Flexible pouch	Flexible pouch
Dimensions	3.25" x 2.5" x 22 mils	7" x 5" x 22 mils
Weight	2.5g ± 10%	15g ± 10%
Nominal capacitance	5F ± 20%	25F ± 20%
Maximum voltage (V, DC)	2.7 V	2.7 V
ESR (DC)	180 mΩ	40 mΩ
Leakage current (25C, 72 hours)	16 μA	0.8 μA



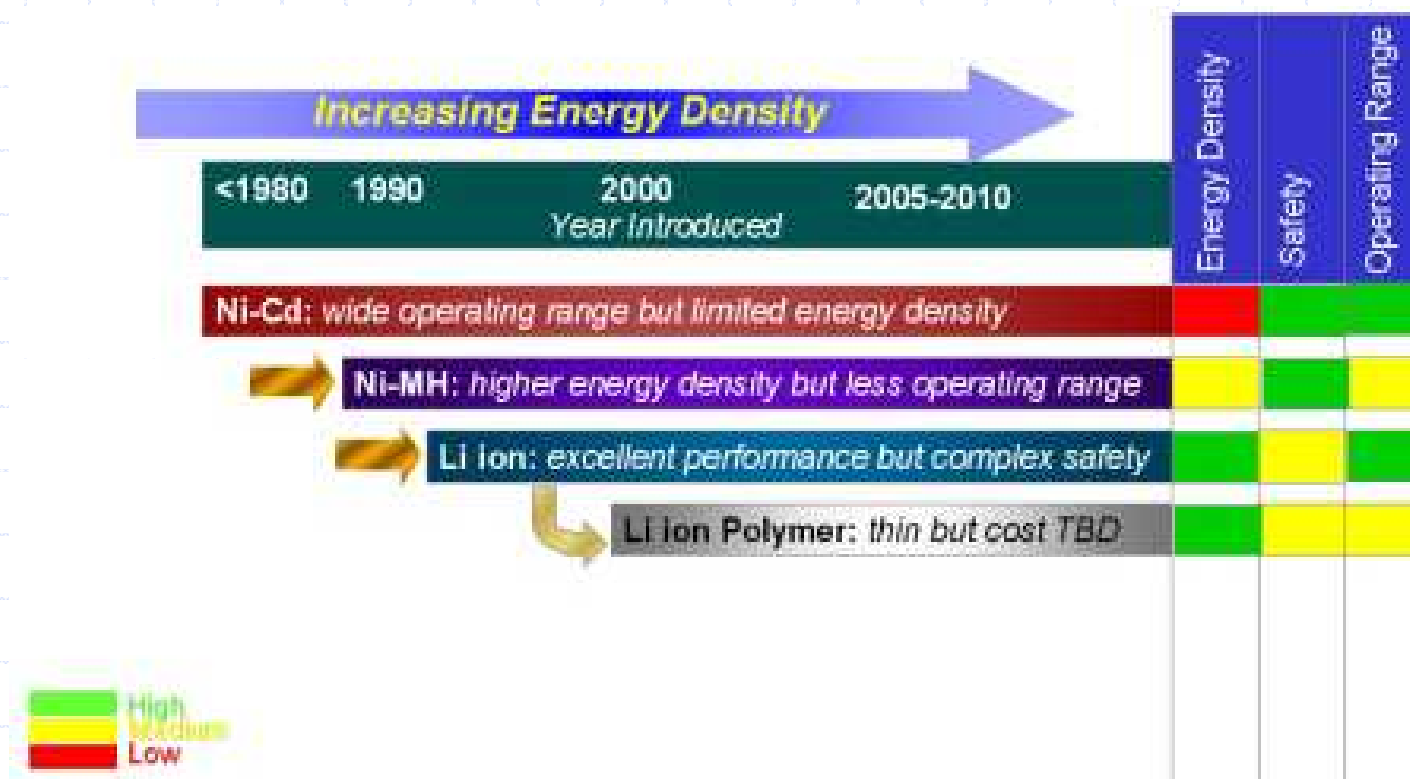
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Conclusions



La demande en capacité ne va pas diminuer