

Feb. 21, 2024

Tokyo-Thailand the Business Connecting 2024

ORLIB



Say Good Bye for “*Rare Metals*”
by The Alternative Pre-Doping New Concept **(p.Si)**
Future Tech For The Highest Energy Batteries

Presented By, **ORLIB Limited**

For Real World Solution

<https://www.orlib.jp>



What ORLIB Original [L·F·P] can do?

World Previous Problem Was:

【 Cruising Range Has Significantly Decreased 】

- The biggest problem with Lithium Iron Phosphate (LFP) is that under the low-temperature environments, its cruising range is dropped about half of regular batteries so that lots of cars had to recall by major car MFG. So far There were no solutions until now.



ORLIB Solutions Is:

【 The New [p.Si] technology with L.F.P. 】

- 【p.Si】 L.F.P. Battery can be worked under the severe low temperature, so that its cruising range won't be effected at all. Normal L.F.P used to perform only 70% under normal temperature to compare with regular LNMC(Lithium Ion) batteries. But with our 【p.Si】, that can be the Same or Least Even 1.5 to 2 Times Better than LIB.
- 【p.Si】 can combinate with any kinds of LIB to boost highest energy & longer cycle life for even aerospace industry because of regardless temperature character. Zero irreversible capacity. Easy & Quick manufacturing, so that suitable for mass production.



Estimation of Energy with **[p.Si]** applied LIB

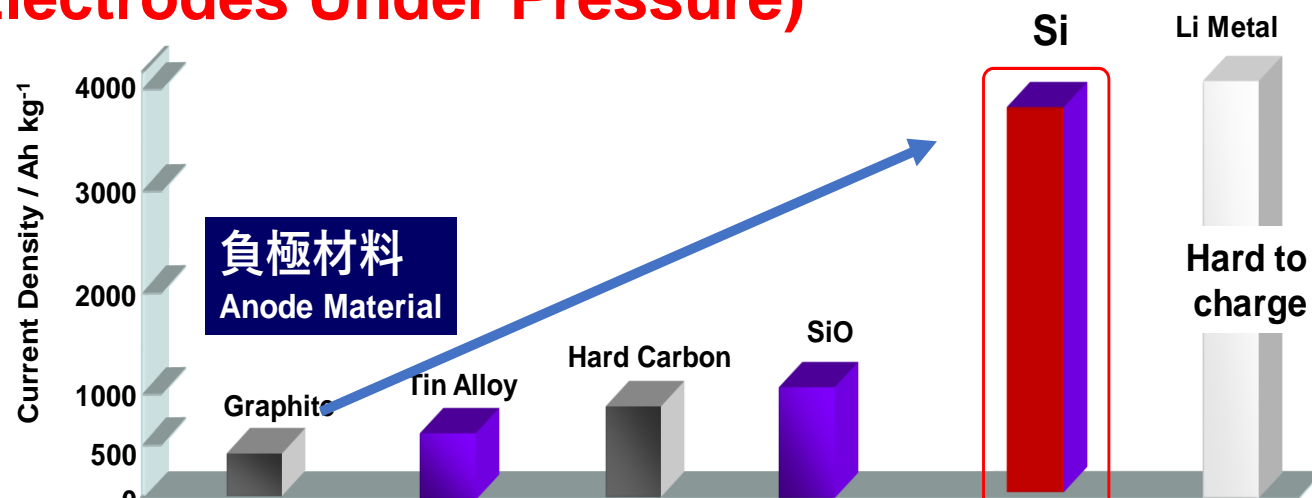
Cathode	Elements	Resource	Stability	Cost	Energy (Wh/kg)	
					Graphite anode	pSi anode, × 1.5
LCO	Co	Insufficient	Good	High	180	270
LMN	Mn	Insufficient	Good	Med	150	225
LNMC	Ni, Mn, Co	Insufficient	Good	High	 200	300
LFP	Fe, P	Sufficient	Excellent	Low	140	 210

Using **[p.Si]** instead of the conventional graphite anode increase energy by **1.5 times**.

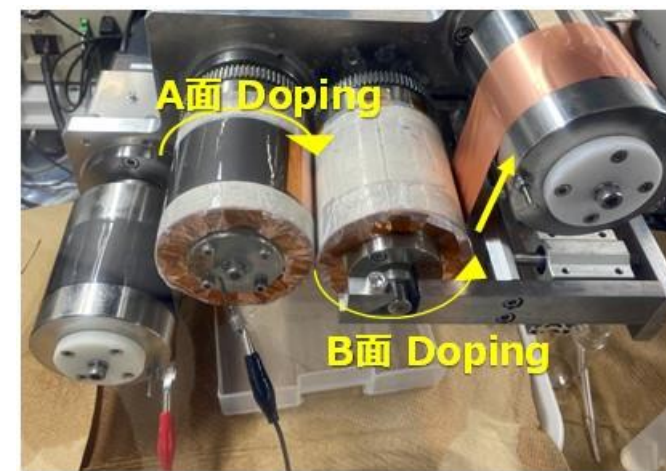
Even LFP, which is abundant in resources, stable, and low cost, can be produce energy compatible to NMC with pSi.

Confidential!!! [p.s.i] Technology

(Electrochemical Pre-Doping of High Capacity Si Electrodes Under Pressure)



FOR YOUR EYES ONLY



【Patent】

(Japan)JP 7170330 B、2022/11/9, (USA) US11,670,756 B2、2023/6/6 (China) CN 111433948 B、2023/9/12
Peer-reviewed paper: Y. Wang et. al., Scientific reports 10, 3208 (2020)



(Rare Metal Free) ORLIB AMAZING TECHNOLOGY

ORLIB

①★ Pressure Electrochemical Pre-Doping Technology (PATENTED)

- This can increase the capacity of Si anode.
- Because Pre-dope can prevent from energy volume loss by charging and discharging, while other ordinary battery had to lose the great amount of that part until now.
- By performing electrolytic pre-doping under pressure, it is possible to increase the capacity and extend the lifespan of secondary batteries in a short time process.
- Need only a short time to make pre-dope and that can enlarge the capacity and longer life time.

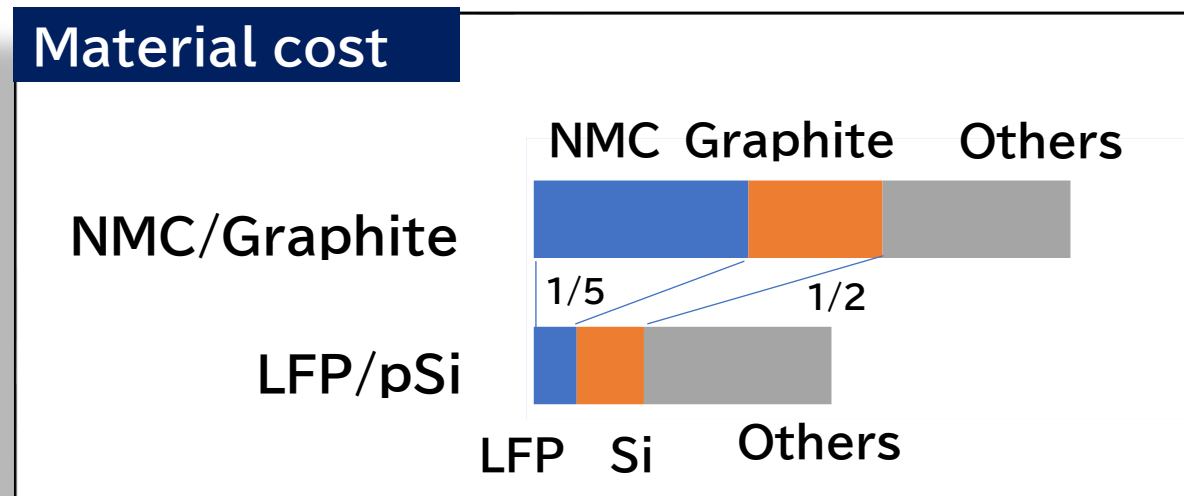
②★ LFP Cathode x 【pSi】 (Pre-doped Silicon) Anode Battery

- The LFP Cathode, which has low manufacturing costs and is easy to produce, can achieve high energy levels equal to or higher than that of the most advanced LIB when combined with a pSi anode that has been pre-doped under pressure.
- It is possible to create earth-friendly secondary batteries such as EV batteries that do not cause resource problems.

LFP/ [p.Si] Battery For EV

***LFP/ [p.Si] is The Potential Solution
For World's Problems, EV, ESS etc.***

- Both LFP and **[p.Si]** are composed of abundant elements, no resource problem
- Same level of energy as cutting edge batteries
- Material price is less than half
- pSi anode can use PC electrolyte, which work well even at low temp.

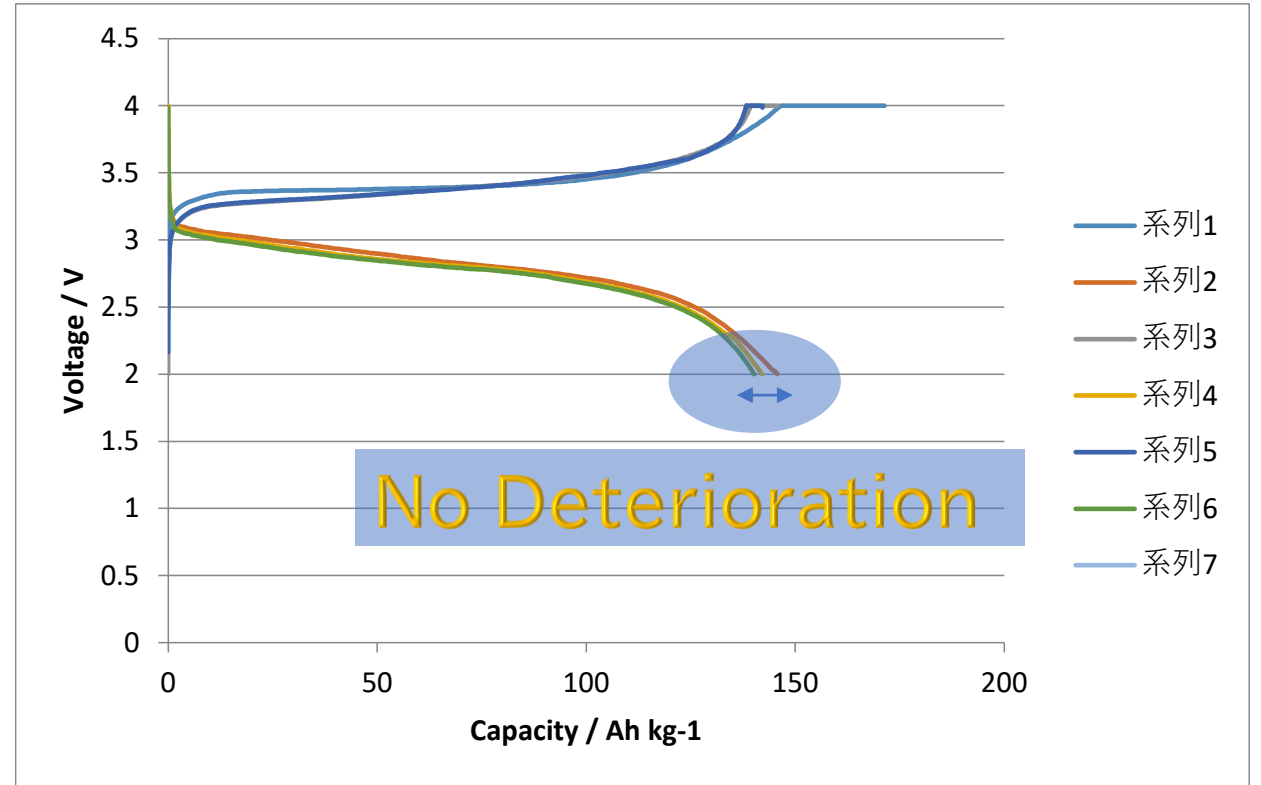
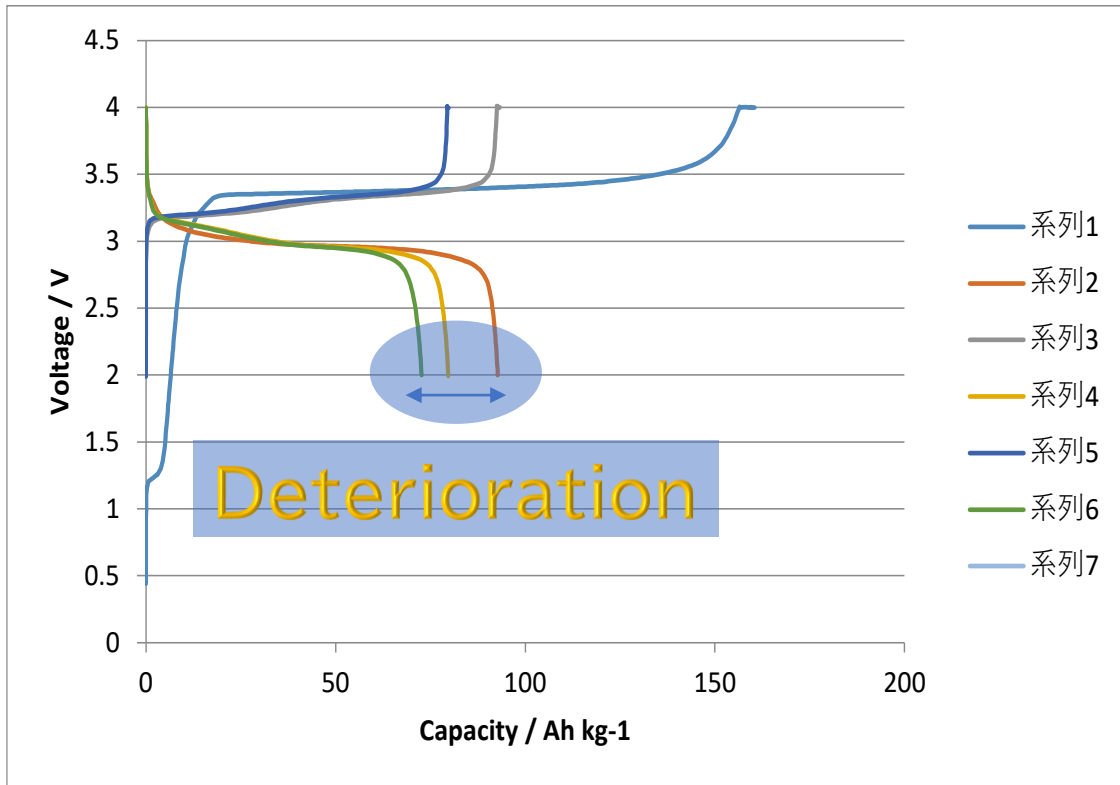


Difference Between: Charge/Discharge Operation

LFP/Normal Si



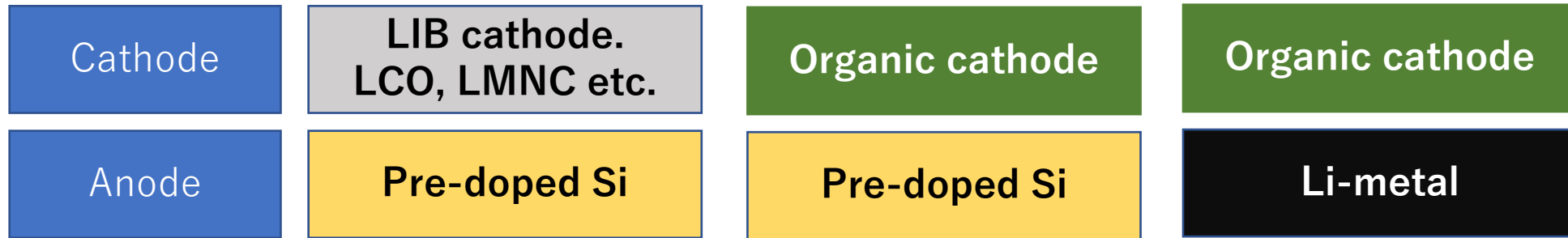
LFP/(p.Si)




High charging/discharging efficiency from the beginning.
Capacity does not decrease even after repeated use.

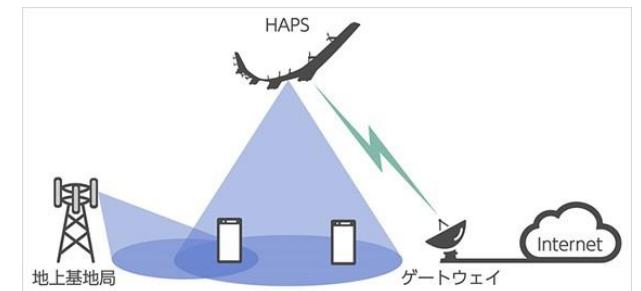
AND MORE OF KEY ELEMENTS

ORLIB has high demands for all the custom needs in every kinds of any batteries.




 Drone battery, LCO/ 【p.Si】
 EV and ESS with LFP/ 【p.Si】

HAPS Battery, Softbank etc.



Our Future Goal

ORLIB realizes a sustainable, vibrant and prosperous society with new high-energy batteries!!! We assure to create a prosperous future in unexplored areas by science and technology.

Thank you!

