Solid – State Sodium Silicate Batteries (SSSB)

Problem addressed

- Dependency on scarce resources
- High production cost
- Low ion conductivity in solid sate electrolytes.
- Limited recyclability and reusability of existing technologies.
- Issues related to dendrite formation and ion loss.
- Dead weight concerns.
- Capacity loss and reduced performance over the time
- Cycle instability

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Intellectual Property:

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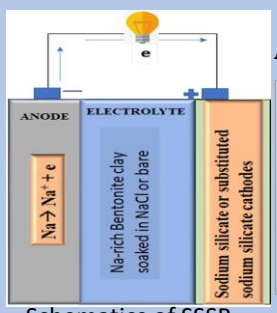
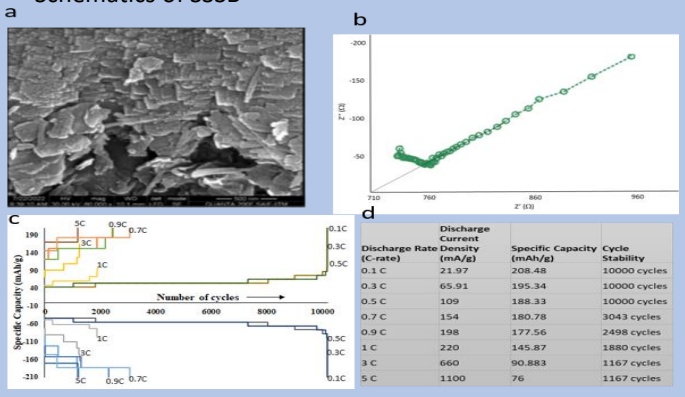


Schematics of SSSB

Application

- ✓ e-mobility
- ✓ Electronic applications
- ✓ Stationary storage applications
- ✓ Toys
- ✓ Drones



Discharge Rate (C-rate)	Discharge Current Density (mA/g)	Specific Capacity (mAh/g)	Cycle Stability
0.1 C	21.97	208.48	10000 cycles
0.3 C	65.91	195.34	10000 cycles
0.5 C	109	188.33	10000 cycles
0.7 C	154	180.78	3043 cycles
0.9 C	198	177.56	2498 cycles
1 C	220	145.87	1880 cycles
3 C	660	90.883	1167 cycles
5 C	1100	76	1167 cycles

Figures
a) Surface Morphology of the Na-enriched RSW(O) in the SSE by HR-SEM
b) Ionic conductivity of the phyllosilicates per unit area of the electrode surface is 1.41 mS/cm
c) Galvanostatic Charge Discharge Profile
d) Battery performance data

Technology:

The current technology is a solid-state sodium silicate battery (SSSB) made with locally available phyllosilicate.

The battery comprises of:

1. A solid state electrolyte (SSE) made wit Na enriched natural phyllosilicate coated polypropylene.
2. A cathode, a sodium silicate Cathode active material.
3. (CAM)
4. An Anode made of carbon black (CB).

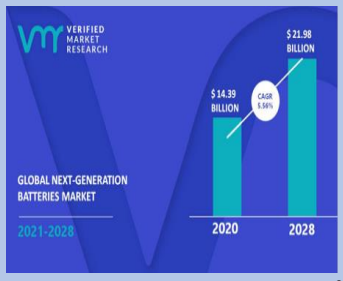
Category of the invention:

- ✓ Electrical
- ✓ Clean Energy
- ✓ Battery Technology
- ✓ Next Generation Transportation
- ✓ Green Technology

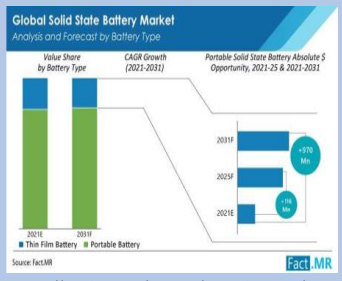
Advantage

- ✓ Enhanced Safety
- ✓ High Energy Density
- ✓ Low Cost and Abundant Materials
- ✓ Low Environmental Impact
- ✓ Completely recyclable and reusable
- ✓ Wide Operating Temperature and pH range
- ✓ Longer Cycle Life
- ✓ Flexibility in Design and Form Factor
- ✓ Resistance to Dendrite Formation
- ✓ No dead weight
- ✓ Improved performance in terms of materials to device.

Potential Value



Source: https://www.verifiedmarketresearch.com/



Source: https://www.factmr.com/connectus/sample?flag=S&rep_id=5801?AS

USP:

- ✓ specific capacity of up to 208.48 mAh/g,
- ✓ Cycle stability of up to 10,000 Cycles.
- ✓ Gravimetric Energy Density of 1.705 kWh/kg.
- ✓ 45.52 hours power back up at 0.1 C-rate
- ✓ Cycle stability ≥ 3000 (80% capacity retention) at abusive conditions.
- ✓ Reversible Na plating/stripping promises high durability
- ✓ Nominal voltage of 3.1 V (at par with present day LiBs)

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