The Road to a Solid-State Powered Future: Sulfide Solid Electrolyte Development, Scale-Up, and the Path to Mass Adoption

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Solid Power

Quick Facts

Founded: 2011

Employees: ~ 230

Facilities:
- **SP1** – Louisville, Colorado, USA
- **SP2** – Thornton, Colorado, USA

Nasdaq: SLDP

Key Financial Statistics:
- Market capitalization – **$395.8M**[1]
- Revenue – **$22.7M**[2]
- Total liquidity – **$279.8M**[1]

Capabilities:
- **SP1** – Pilot cell production; cell R&D
- **SP2** – Pilot electrolyte production; electrolyte innovation center; cell test

Technology

Sulfide-based solid electrolyte, replacing liquid or gel electrolyte in traditional lithium-ion battery

Solid Power's electrolyte technology has the potential to **improve battery performance** through increased energy density, longer battery life, and better safety

Strong IP position:[3]
- **>20** issued US patents
- **>90** pending US patent applications
- **>115** non-US and PCT patents and applications
- Trade secrets and know-how

Commercialization

Commercialization strategy to **manufacture and sell electrolyte** to Tier 1 battery manufacturers and automotive original equipment manufacturers (OEMs) – **aim to work with, not compete**

Established **Korean presence** to better integrate into Asian battery ecosystem

Collaborate with **leading industry partners** including:

SK on · BMW · Ford

Capital Position

Capital light model – electrolyte development and production expected to have significantly lower capital requirements than cell manufacturing

Strong liquidity position to support operations

No debt financing, increasing financial stability

DOE **grant of up to $50M** to expand electrolyte production capabilities

1. As of June 30, 2025; 2. Twelve months ended June 30, 2025; 3. As of June 30, 2025

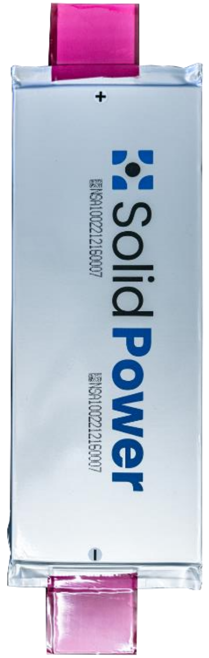
Solid Power's Business Model

Sulfide Solid Electrolytes

- Proprietary sulfide-based solid electrolytes
- Tuned for high conductivity and processability
- IP around powders, powder processing and production scale-up
- Can be sold to companies pursuing their own sulfide-based all-solid-state batteries

Energy Dense Pouch Cells

- Proprietary design and production of all-solid-state pouch cells
- IP around electrode formulations, layer processing and cell assembly
- Compatible with multiple cathode and anode materials
- Pilot line to produce 0.2Ah to 60 Ah EV-scale pouch cells



- "CAPEX-light" sulfide electrolyte material supplier
- Cell development and production capabilities to support electrolyte development and to test, validate and optimize Electrolyte products in actual cell applications

Solid Power / BMW Collaboration

Announced in May 2025: BMW began testing i7 test vehicle containing large-format all-solid-state cells from Solid Power on the roads of Munich

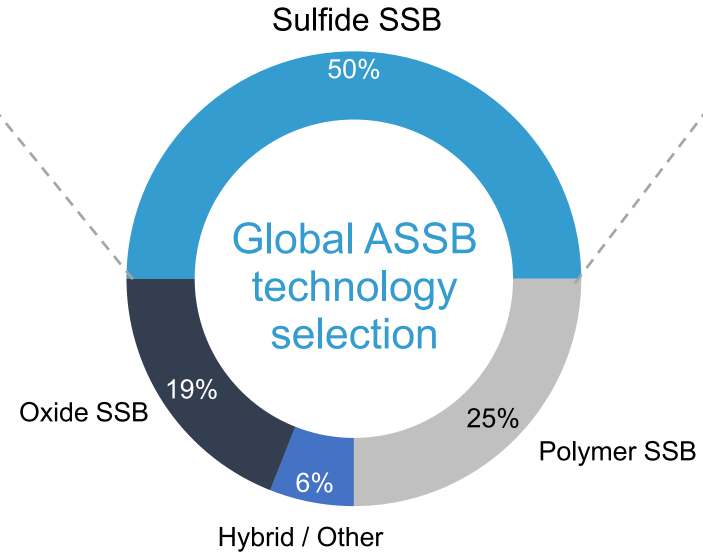
Sulfide Electrolytes Continue to be Top Option for Solid-State

Automotive OEMs and Tier 1 battery manufacturers are choosing sulfide-based chemistries for their solid-state programs

Market tech choice – Sulfide ASSB

We believe sulfides offer the **best balance of performance and mass production attributes** for ASSB chemistries:

- **Highly manufacturable** at scale
- Superior **ionic conductivity**
- **Compatible with leading ASSB cell** configurations



Source: PEM | RWTH Aachen University

Value chain players pursuing sulfide chemistries

Materials suppliers	Cell manufacturers	Automotive OEMs
Solid Power	SK on	BMW
POSCO FUTURE M	SAMSUNG SDI	Ford
MITSUI KINZOKU	LG Energy Solution	KIA
LOTTE ENERGY MATERIALS	Panasonic	HYUNDAI
idemitsu	CATL	HONDA
EcoPro	Factorial	NISSAN
		BYD
		TOYOTA
		NIO
		Mercedes-Benz
		STELLANTIS

Source: Roland Berger internal research

Solid Power – Differentiation

Rapid innovation through integrated electrolyte and cell capabilities position Solid Power as an industry leader

Electrolyte Material

Solid Power's electrolyte technology has the potential to **enable a step-change improvement** in battery cell performance

We believe sulfide electrolytes provide the best-known balance of **conductivity** and **processability** out of all solid electrolyte classes

Currently **2** pilot electrolyte manufacturing lines with **capacity of 30MT** per year

Plan to grow capacity to 75MT per year by end of 2026 by installing **continuous manufacturing** pilot line

Feedback Loop

Cell Design to Electrolyte Development

Feedback from **cell development enables electrolyte performance improvements** and supports partners' cell programs

Electrolyte Innovation Center (EIC) designed to allow rapid changes to electrolyte chemistry and manufacturing processes, **accelerating electrolyte improvements with lower costs**

Able to produce solid-state cells from **0.2 Ah to 60 Ah**

Solid Power cell technology **licensed by BMW and SK On** to enhance their battery cell manufacturing capabilities

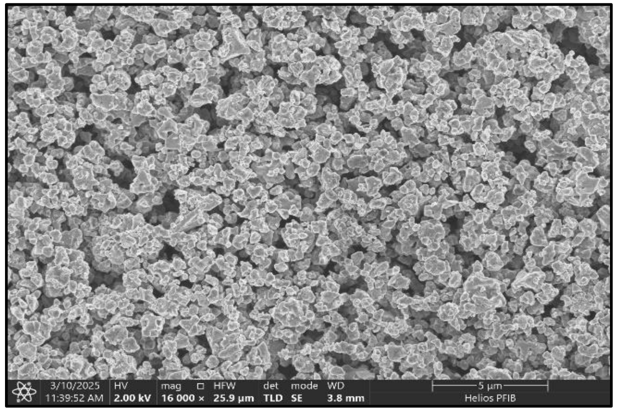
Solid Power cell processes **developed around industry-standard** lithium-ion cell manufacturing **processes and equipment**

Cell Capabilities

Solid-State Electrolyte Powder Products

LiPSCl Argyrodite powders designed for cell-level performance

Metric	Gen 1	Gen 2	Gen 3
Li ion Conductivity @ 25 C (mS/cm)	>1.5	>3.25	>5.0
Electronic Conductivity (S/cm)	<1.0E-8	<1.0E-8	< 1.0E-8
Pellet Density (g/cm3)	>1.35	>1.40	>1.40
Surface Area (m2/g)	< 15	< 15	< 15
Particle Size (um) - D50*	1.0um - 3.0um	1.0um - 3.0um	1.0um - 3.0um
Particle Size (um) - D90	<10	<10	<10



Addressing Three Main Drivers of Sulfide Electrolyte Cost

- Production Scale
- High-throughput processes
- Li_2S precursor cost

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- **Production Scale**
- High-throughput processes
- Li_2S precursor cost

- "SP2" pilot line in Thornton, CO operational since 2023
- Capacity of up to **30 metric tons annually** from 2 pilot lines
- Producing material for customers and internal use

Addressing Three Main Drivers of Sulfide Electrolyte Cost

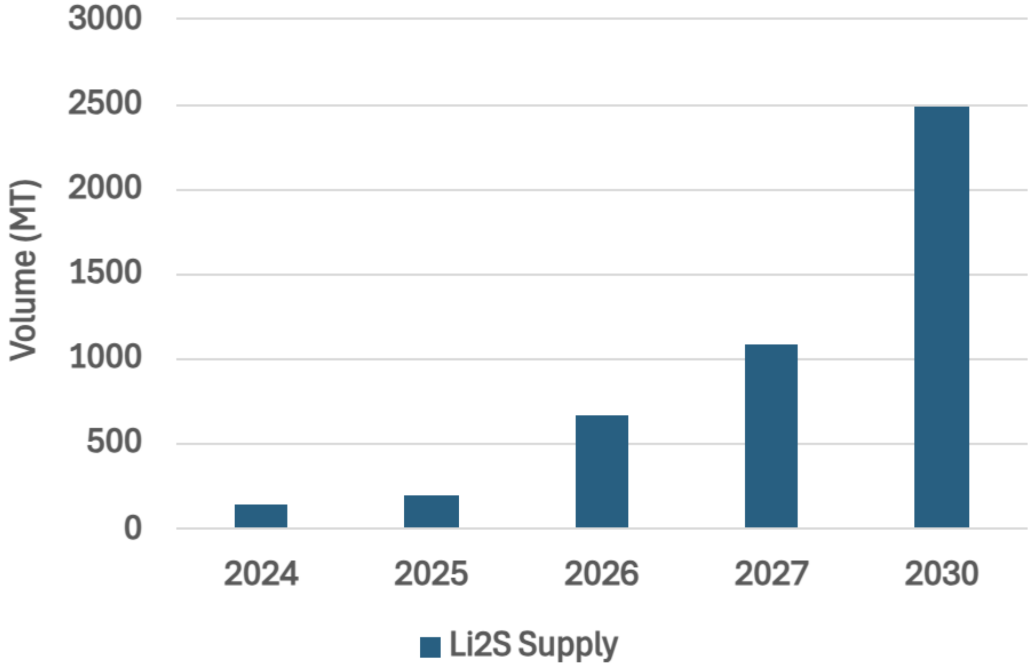
- **Production Scale**
- **High-throughput processes**
- Li_2S precursor cost

- Designing continuous production pilot line under Department of Energy-funded project
- Expecting to scale to 75 MT/year capacity in 2026
- Sets the stage for mass production as demand matures

Addressing Three Main Drivers of Sulfide Electrolyte Cost

- Production Scale
- High-throughput processes
- **Li_2S precursor cost**

Projected Li_2S Supply Capacity in South Korea*



- Approaching inflection point in projected Li_2S supply capacity*
- Li_2S supply expected to keep up with near-term electrolyte demand prior to mass commercialization*
- Conventionally produced by reacting battery-grade LiOH with high-purity H_2S gas

*Solid Power projections

Hedging Li_2S Supply and Cost Risks

Solid Power is developing alternative production routes for Li_2S

Simplified R&D Example:

NaCl can be filtered out of solution

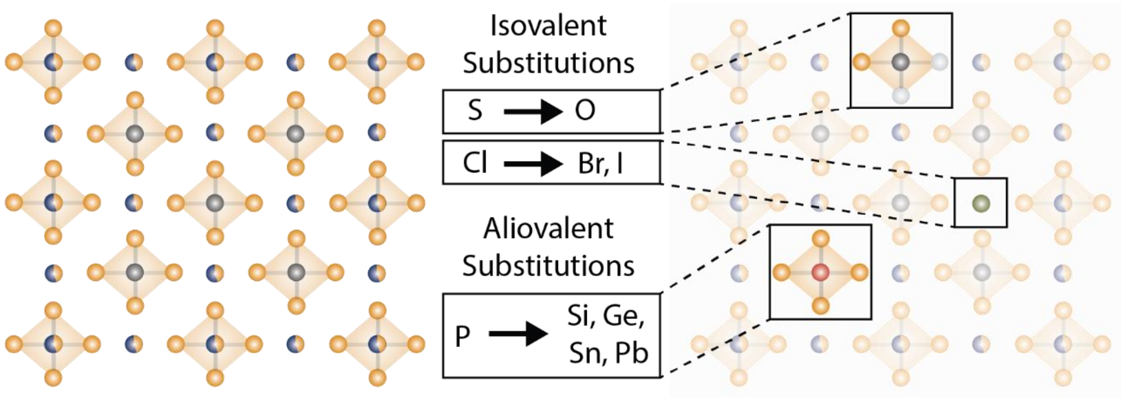
$$2LiCl + Na_2S \rightarrow Li_2S + 2NaCl$$

Metathesis reaction in ethanol

- H_2S-free process using LiCl and Na_2S
- Typical LiCl brine impurities can be filtered out, potentially allowing non-battery-grade LiCl concentrate to be used as a precursor
- **Lower cost material inputs and processing advantages show potential to reduce Li_2S cost**

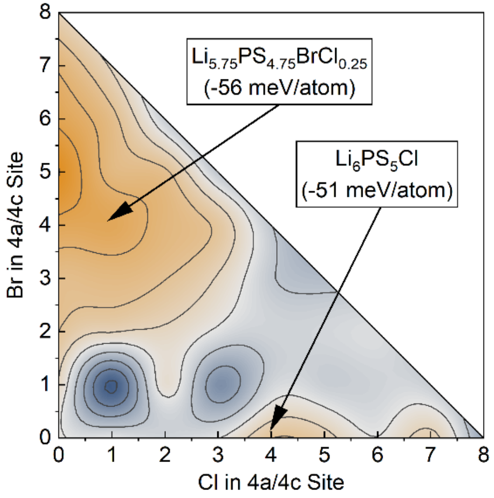
Modeling to Accelerate Next-Gen Electrolyte R&D

For each electrolyte composition that has been synthesized…

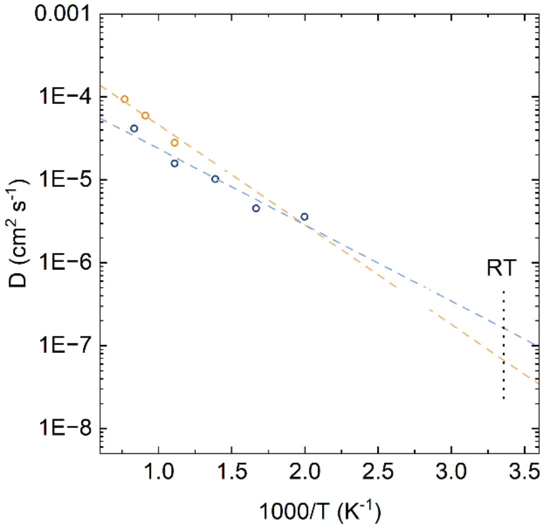


… there are 10,000+ possible substitution combinations.

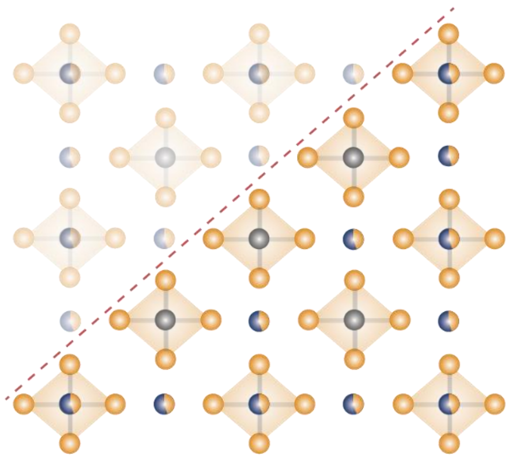
Is it thermodynamically stable?



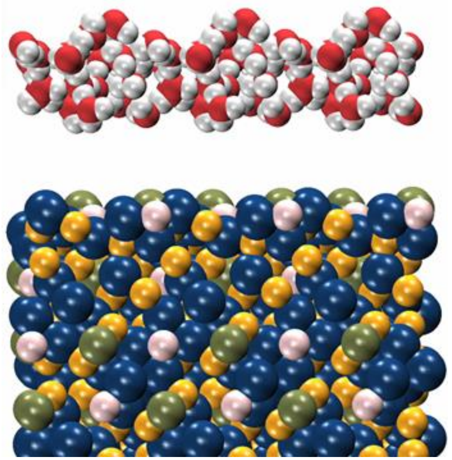
Does it conduct Li^+ ions?



What surface(s) will be exposed?



Will the exposed surface(s) react?



Upcoming Publication on MLIP Use for Sulfide Modeling

Universal machine-learned interatomic potentials (MLIPs) can be used to substantially increase the throughput of atomic-scale DFT calculations, decreasing computational costs by orders of magnitude

Matbench Discovery

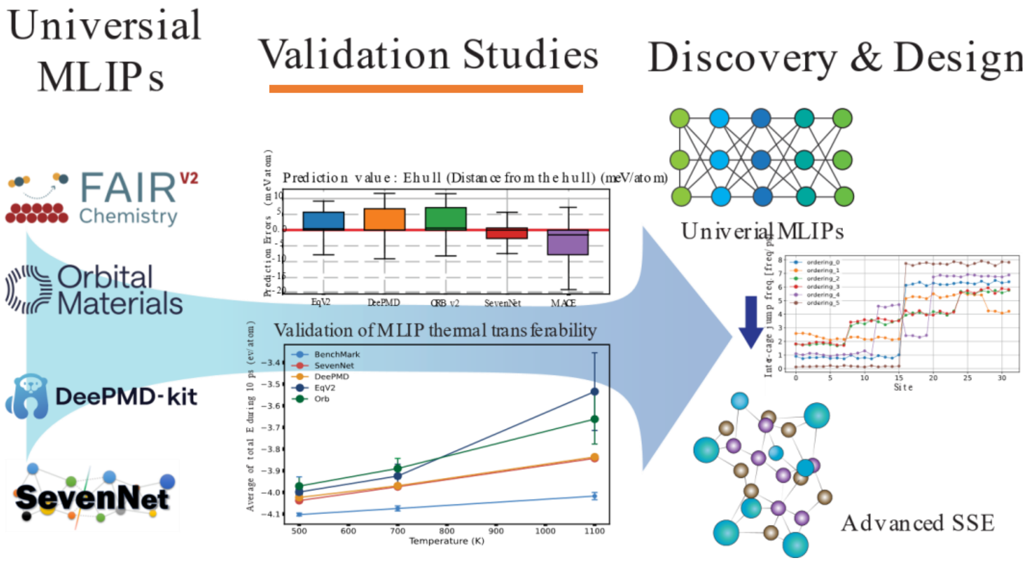
Full Test Set | Unique Prototypes | 10k Most Stable

Click on column headers to sort table rows

☑ Compliant models ☑ Non-compliant models ☐ Energy-onl

Model	CPS ↑	Acc ↑	F1 ↑	DAF ↑	Prec ↑	MAE ↓	R^2 ↑	κ_{SRME} ↓	RMSD ↓	Training Set	Params	Tar
eSEN-30M-OAM	0.888	0.977	0.925	6.069	0.928	0.018	0.866	0.170	0.061	6.6M (113M) OMat24+MPtrj+sAlex	30.2M	EFS
ORB v3	0.861	0.971	0.905	5.912	0.904	0.024	0.821	0.210	0.075	6.47M (133M) MPtrj+Alex+OMat24	25.5M	EFS
SevenNet-MF-ompa	0.845	0.969	0.901	5.825	0.890	0.021	0.867	0.317	0.064	6.6M (113M) OMat24+sAlex+MPtrj	25.7M	EFS
GRACE-2L-OAM	0.837	0.963	0.880	5.774	0.883	0.023	0.862	0.294	0.067	6.6M (113M) OMat24+sAlex+MPtrj	12.6M	EFS
DPA-3.1-3M-FT	0.802	0.963	0.884	5.667	0.866	0.023	0.869	0.469	0.069	163M OpenLAM	3.27M	EFS
eSEN-30M-MP	0.797	0.946	0.831	5.260	0.804	0.033	0.822	0.340	0.075	146k (1.58M) MPtrj	30.1M	EFS

Global ranking of MLIP accuracy at Matbench



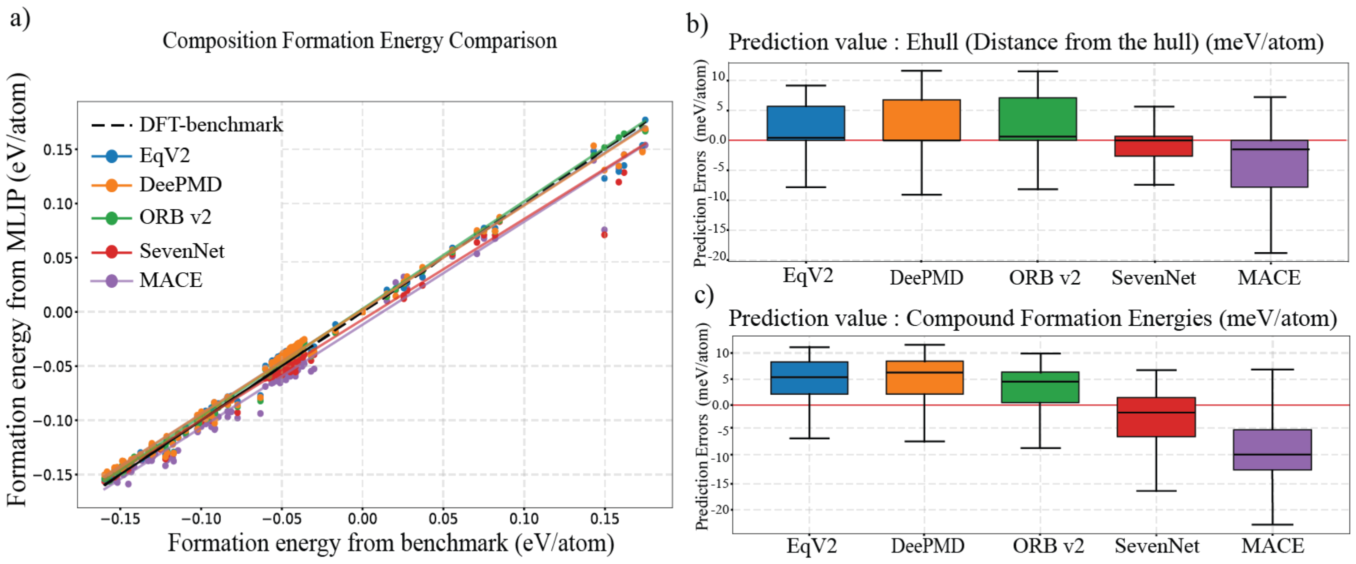
Assessing real-world applicability

Do universal accuracy ratings correlate with fitness for a specific application?

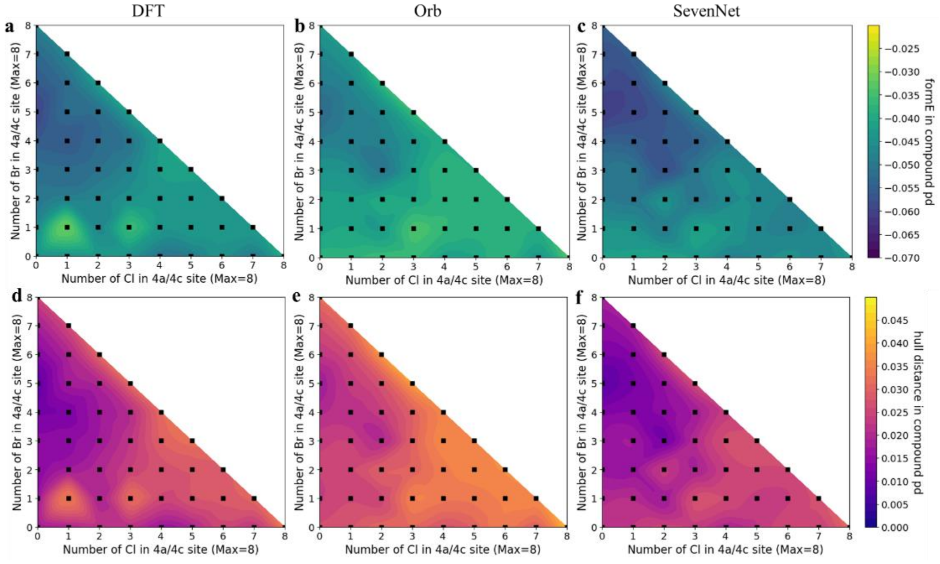
Examples of Validation for MLIPs

Employed conventional DFT methods to generate a validation set, using the Li_6PS_5Cl argyrodite as a model system.

Used the top-ranked MLIPs on Matbench to calculate formation energies against the validation set, for comparative analysis.



Some high-ranking models exhibited systematic bias in formation energy calculations.



Doping series comparisons demonstrated that the top ranked model (Orb v2) had difficulty re-creating energy contours, relative to the model that showed balanced errors (SevenNet).

Thank You!

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