



# WPI



U.S. DEPARTMENT OF  
**ENERGY**

Argonne  
NATIONAL LABORATORY



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UNITED STATES ADVANCED BATTERY CONSORTIUM

microvast



# Solvent-Free Electrode Manufacturing for EV Batteries

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Slides Preparation: Jinzhao Fu



# WPI

## Increasing Needs on EV Batteries

Electrical Vehicle requirements

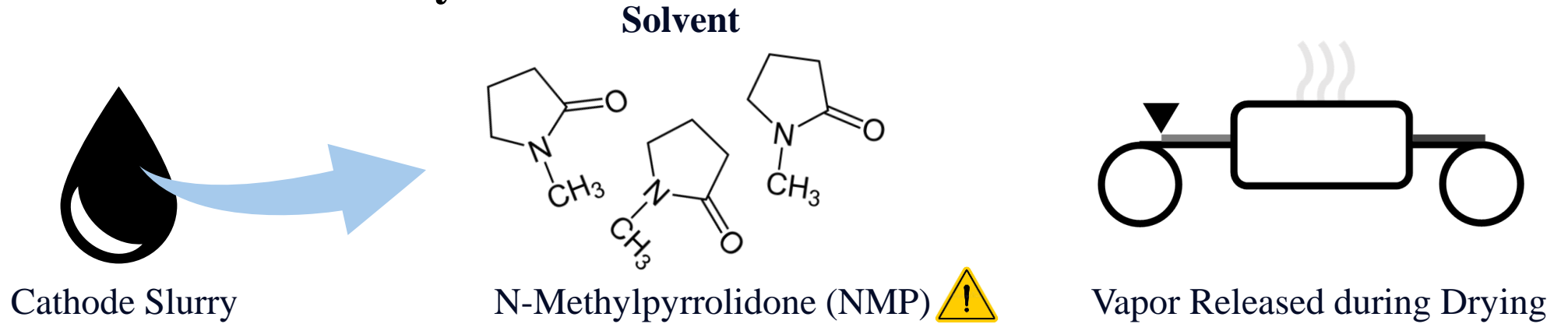
- More Vehicles – Batteries are needed for production
- Longer Range – Higher battery capacity

**More batteries are needed.**

*“The yield of LIBs for EVs could reach **0.33** to **4 million metric tons** from 2015 to 2040.”*

## Concerns on Battery Manufacturing

- Environmental & Healthy



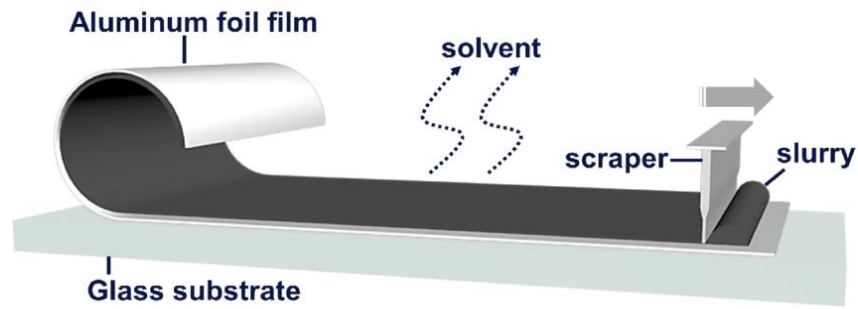
- Energy Consumption

| Step                                      | Energy Consumption<br>(kWh/kWh cell) |
|---|--------------------------------------|
| Slurry Mixing                             | 0.88                                 |
| Coating                                   | 1.44                                 |
| Drying/Solvent Recovery                   | 49.76                                |
| Calendering                               | 3.04                                 |
| Electrode Processing & Cell Manufacturing | 19.36                                |
| Associated Testing                        | 0.56                                 |
| Dry Room                                  | 31.2                                 |
| Total                                     | 106.24                               |

\*Just For 1kWh Battery Cells

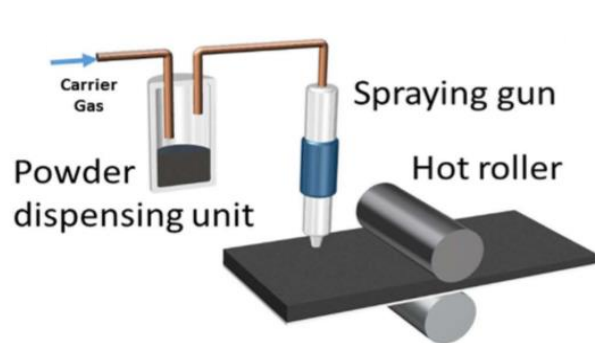
## Why Solvent-Free?

- **Slurry Casting**



Instead of casting the slurry, a spray system is developed to distribute the dry powder direct onto current collector.

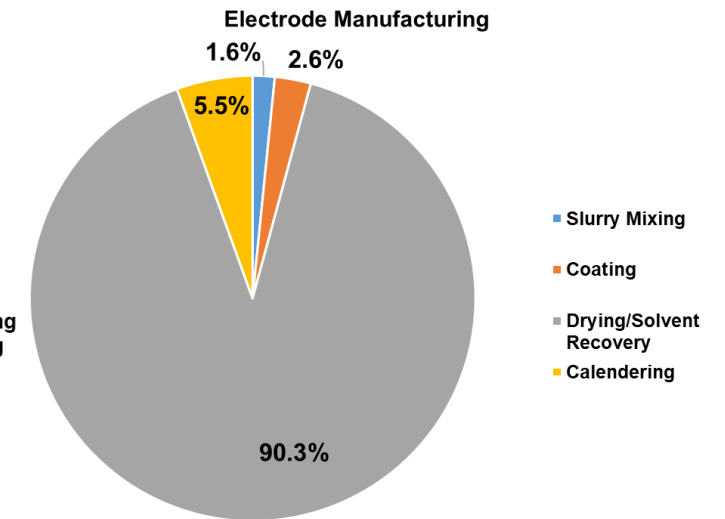
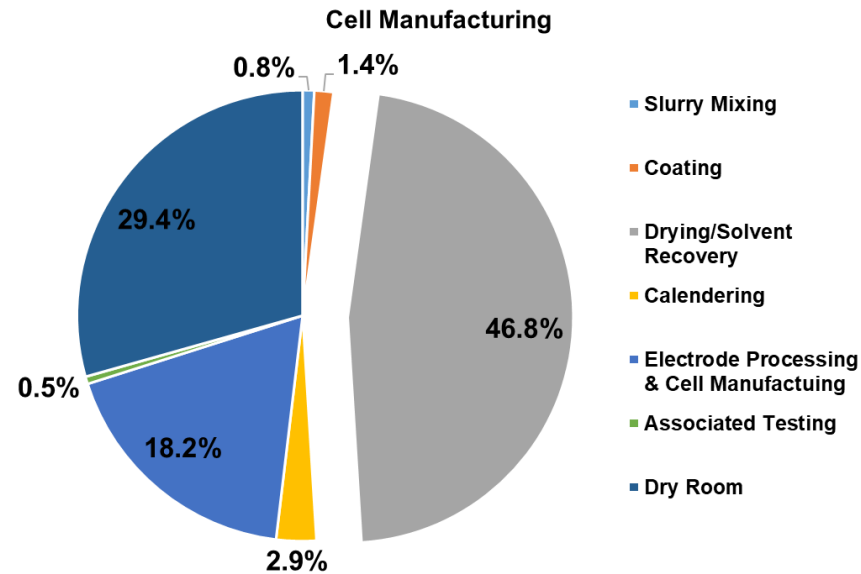
- **Solvent free manufacturing**



**No solvent, No drying, No harmful vapor**

# Why Solvent-Free?

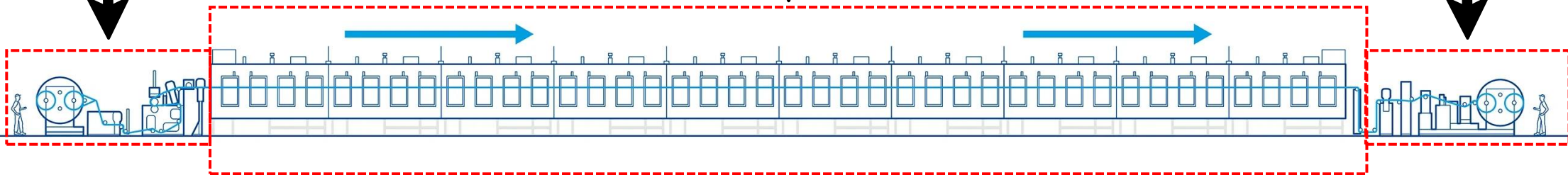
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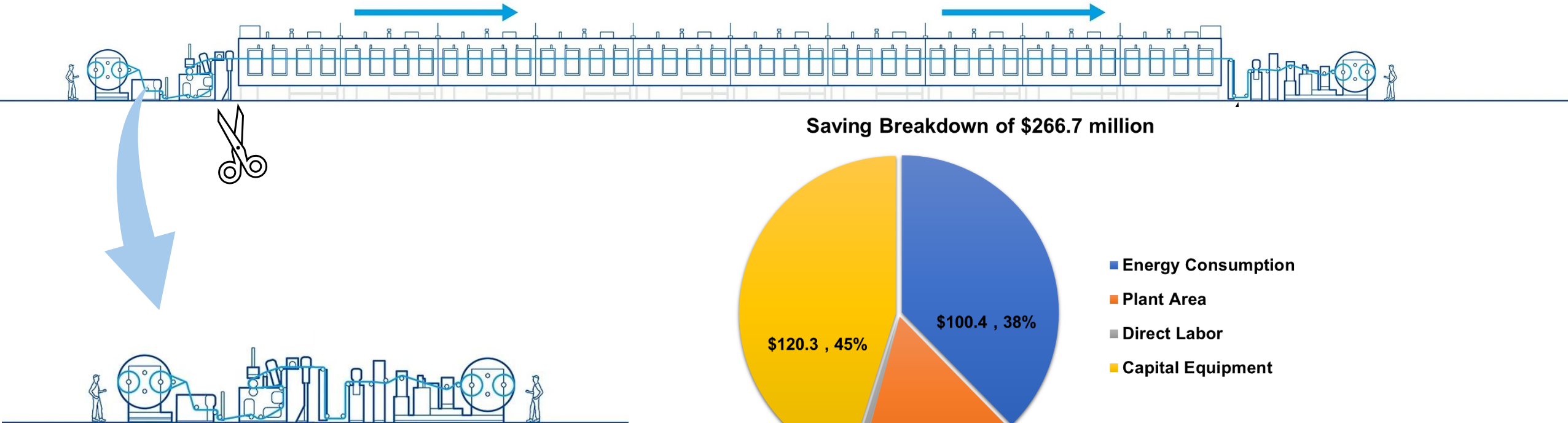
All of this part is for drying and vapor collection.

Electrode is casted here

Electrode is received here



## Why Solvent-Free? Cost Efficient & Eco-Friendly

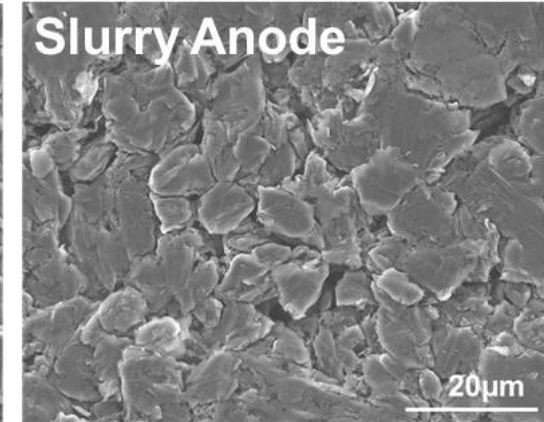
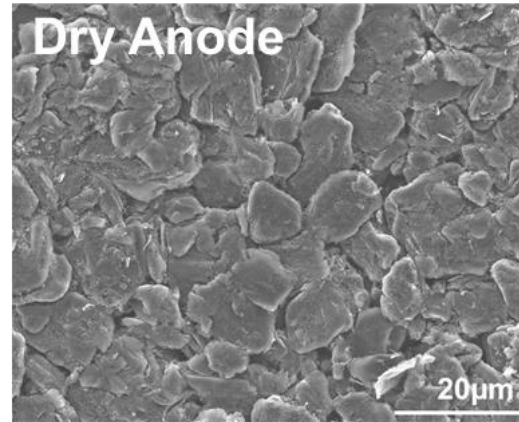
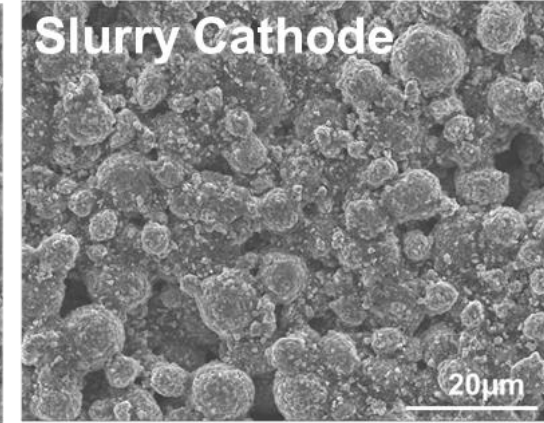
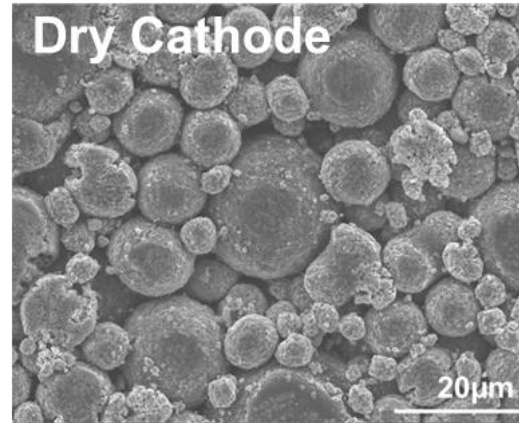
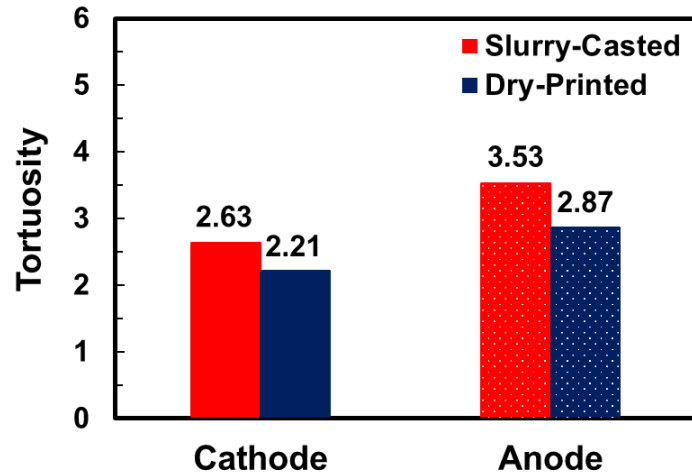
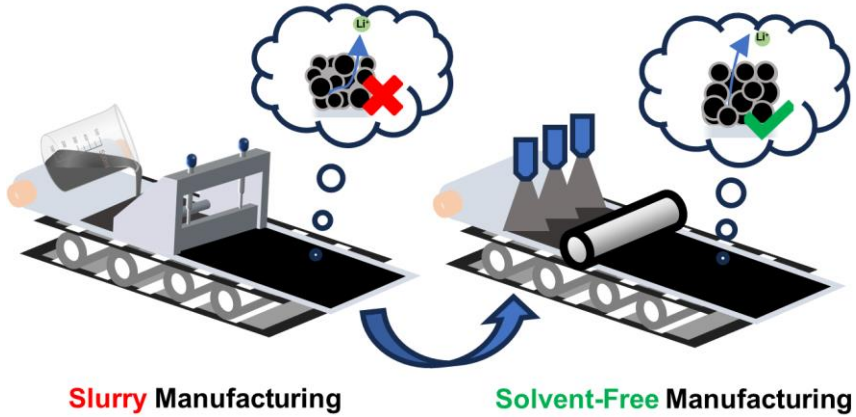


That is \$5.3 saving towards per kWh cell produced, which is ~5.4% extra profit for the final cell production.



## Why Solvent-Free?

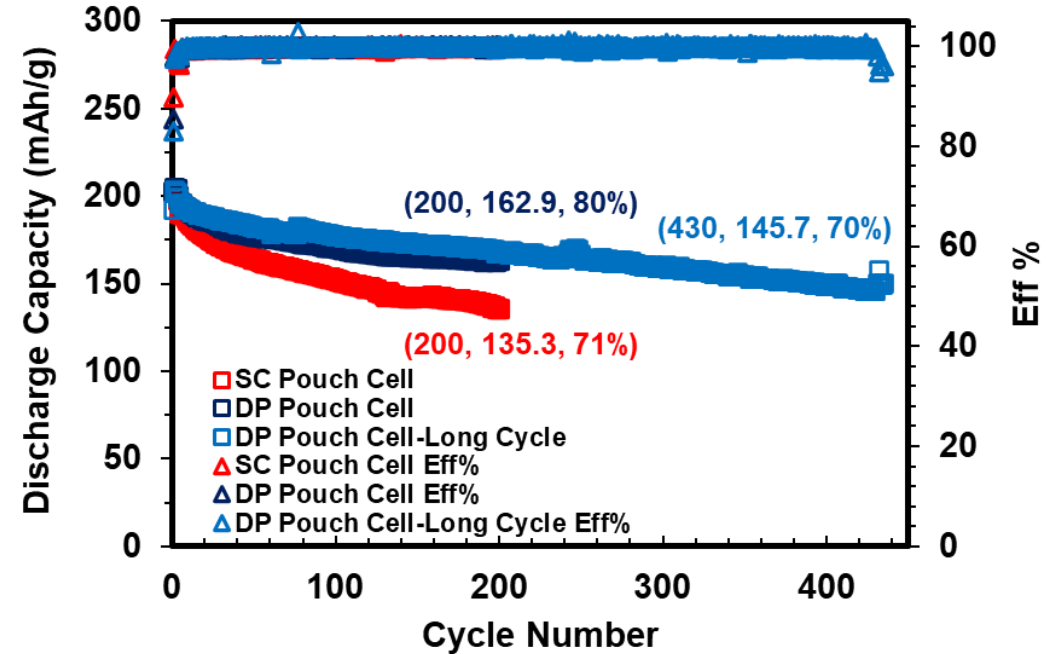
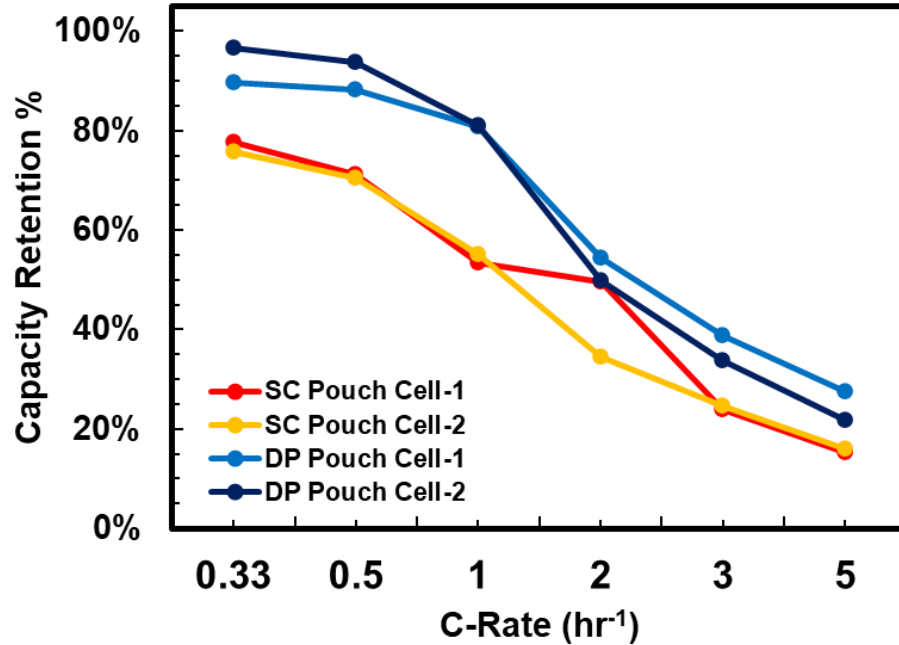
Better Li-ion Diffusion



- Unique **micro-structure** is achieved through the solvent-free electrode manufacturing.



## Why Solvent-Free? Better Performance



- The Unique micro-structure also enabled **Better Rate Capability and Cyclability**



***Thank you for your attention***

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