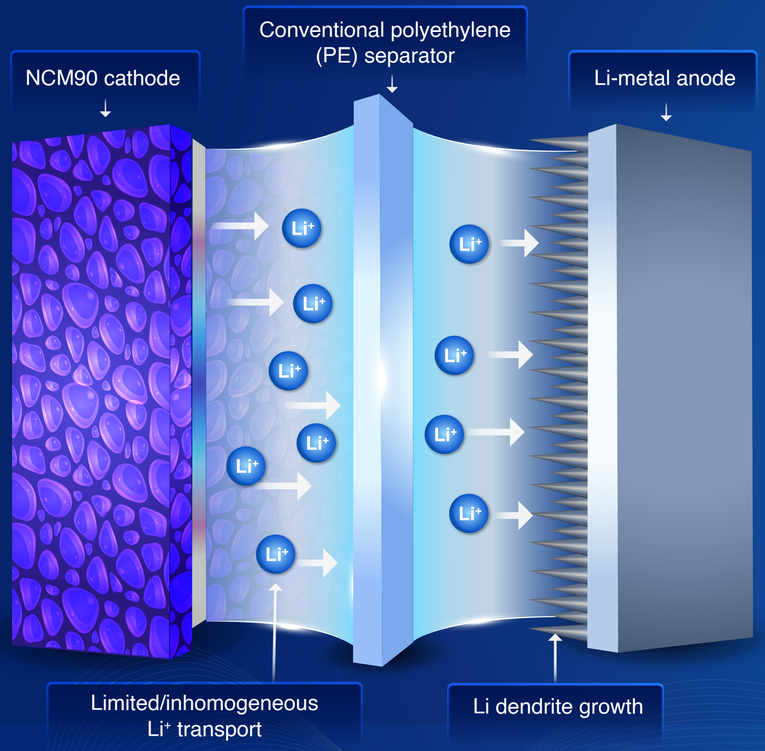
Fast Charge–Discharge of Energy-Dense Lithium (Li)-Metal Batteries Enabled by a Bikitaite (BKT)-Infused Separator

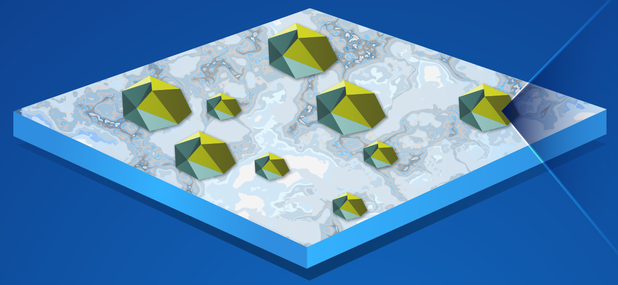
High-energy-density lithium-metal batteries combine Ni-rich cathodes, such as NCM90, with a Li-metal anode



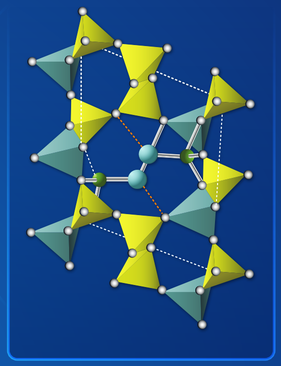
However, fast charging and discharging remain difficult due to sluggish Li^+ transport and instability at the Li anode

Bikitaite-infused cellulose-based separator (CBT)

- High ionic conductivity: 3.45 x 10^{-3} S cm^{-1}
- High Li^+ transference number: 0.742

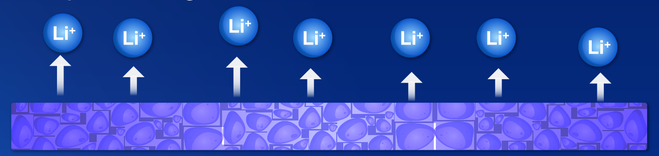


Fast and uniform Li^+ transport across the cell



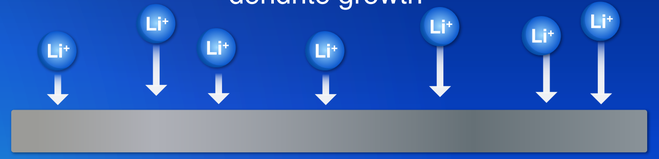
Cathode

Improved high-rate reaction kinetics of NCM90



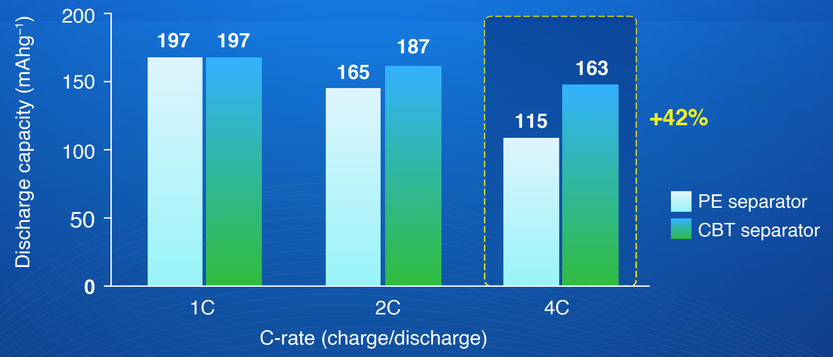
Anode

Uniform Li deposition leads to suppressed dendrite growth



Implications

~42% higher discharge capacity at 4C



- ~60% capacity retention after 2,500 cycles (2C charge/4C discharge)
- ~68.9% retention after 150 cycles at –25 °C
- Thermally stable (200 °C)
- Stable Li-metal interface

The BKT separator delivers a dual benefit: suppressing Li dendrites at the anode while enabling high-rate cycling in energy-dense NCM90 cathodes

Fast Charge–Discharge of $LiNi_{0.9}Co_{0.05}Mn_{0.05}$ Enabled by a Bikitaite-Infused Separator for Li Metal Batteries
Phiri *et al.* (2026) I Corresponding Author: Prof. Sun-Yul Ryou I *Advanced Functional Materials* I DOI: 10.1002/adfm.75036

HANBAT NATIONAL UNIVERSITY