# Article information:

Synthesis and Characterization of the Lithium-Rich Core–Shell Cathodes with Low Irreversible Capacity and Mitigated Voltage Fade | Chemistry of Materials  
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# Article summary:

1. Lithium-rich core-shell cathodes with low irreversible capacity and mitigated voltage fade have been synthesized and characterized for use in rechargeable lithium ion batteries.

2. The core-shell structure with Ni-rich materials as the core and Mn-rich materials as the shell can balance the pros and cons of materials in a hybrid system, providing high energy density, good rate capability, and hindering electrolyte oxidation.

3. The structural and electrochemical properties of the core, shell, and CS materials were carefully measured and some excellent core-shell materials were developed.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article discusses the development of lithium-rich core-shell cathodes for use in rechargeable lithium-ion batteries. The authors highlight the need for safer, longer-lasting batteries with higher energy density and lower cost, particularly for electric vehicles and stationary energy storage. They note that increasing the charging voltage of cells with NMC-based positive electrodes can increase energy density, but this can lead to problems such as electrolyte oxidation.

The authors explore the use of layered lithium cobalt oxide (LCO) as a positive electrode material, but note that cobalt-free or low-cobalt alternatives are required due to the high cost of Co. They discuss the use of lithium-rich NM/NMC materials with excess lithium in the transition metal layer as a promising alternative to LCO. However, these materials have issues with irreversible capacity and voltage fade.

To address these issues, the authors propose a core-shell structure with Ni-rich materials as the core and Mn-rich materials as the shell. They describe their synthesis and characterization of these materials and report on their structural and electrochemical properties.

Overall, the article provides a thorough exploration of lithium-rich core-shell cathodes and their potential applications in rechargeable lithium-ion batteries. However, it is important to note that the authors may have biases towards their own research and may not have fully explored counterarguments or alternative perspectives. Additionally, while they mention potential risks associated with using certain electrode materials, they do not provide a comprehensive discussion of safety concerns related to battery technology.

# Topics for further research:

* Safety concerns of lithium-ion batteries
* Cobalt-free positive electrode materials for lithium-ion batteries
* Irreversible capacity and voltage fade in lithium-rich cathodes
* Alternative electrode materials for high-energy density batteries
* Charging voltage optimization for lithium-ion batteries
* Cost reduction strategies for lithium-ion batteries

# Report location:

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