



Importance of 'Unimportant' Experimental Parameters in Li-S Battery Development

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Carbon-sulphur electrodes based on simple physical mixing of carbon black (Super P) and elemental sulphur can yield performance values at least as good as those of most electrodes based on structured carbons and advanced preparation methods. Here we demonstrate the importance of often-neglected experimental parameters that influence the performance of Li-S batteries.

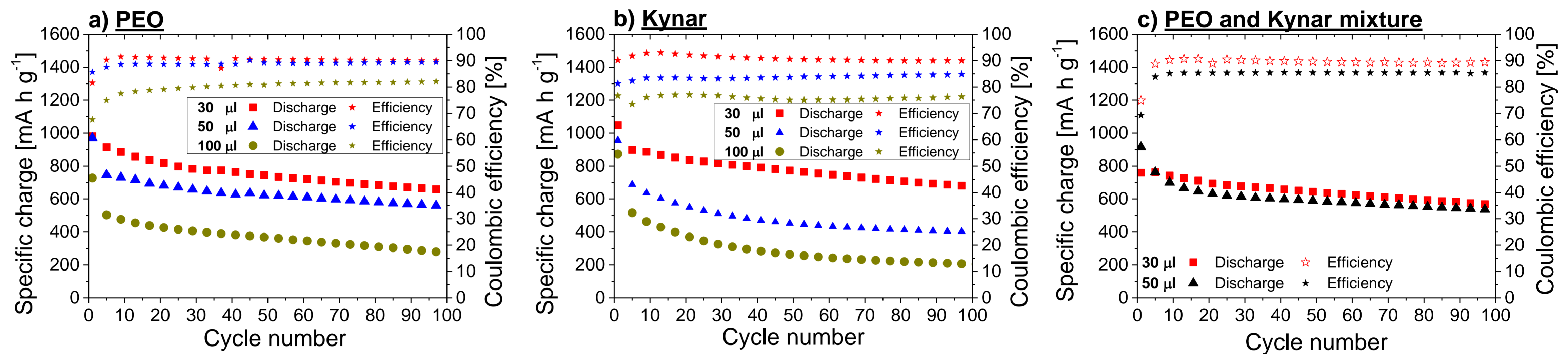
Electrolyte Amount and Binder

Electrode composition:
60% S, 30%C, 10% PEO* binder

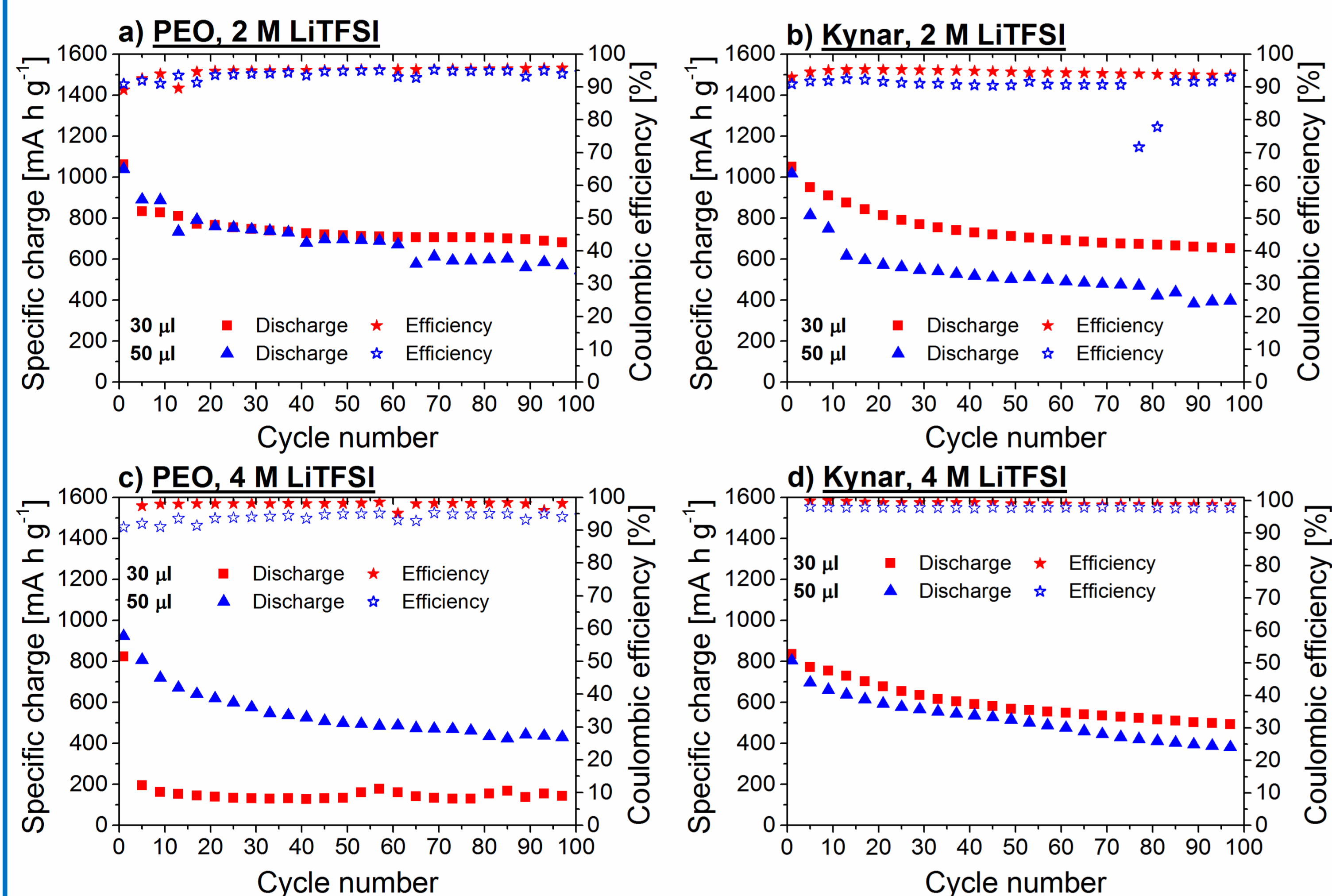
Electrolyte:
1M* LiTFSI in DME:Diox (2:1)
With or without 0.5 M LiNO₃

*if not indicated otherwise

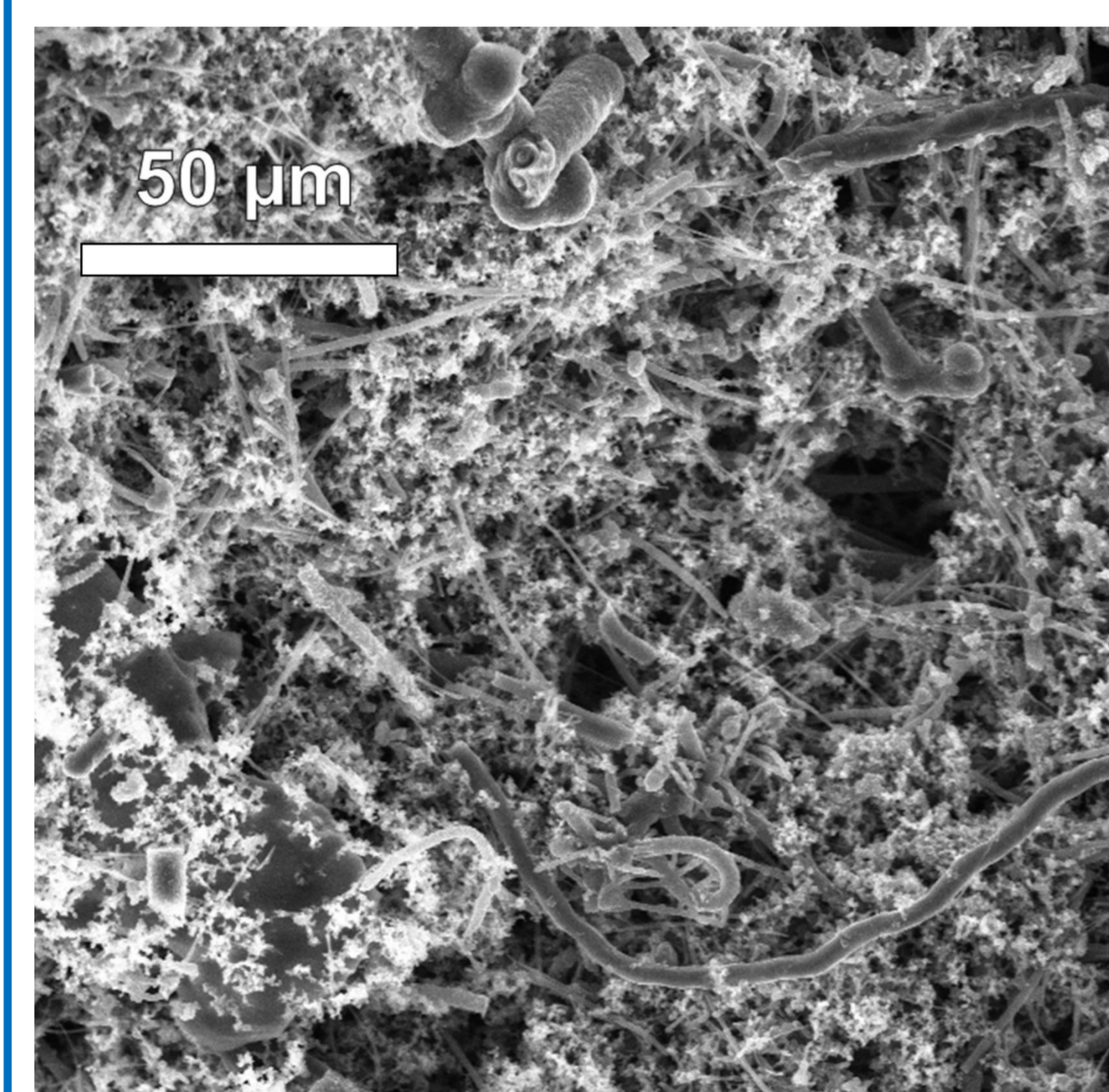
Cycling conditions:
1.8-2.7V, C/5, where C=1675 mA/g_s



Electrolyte Salt Concentration

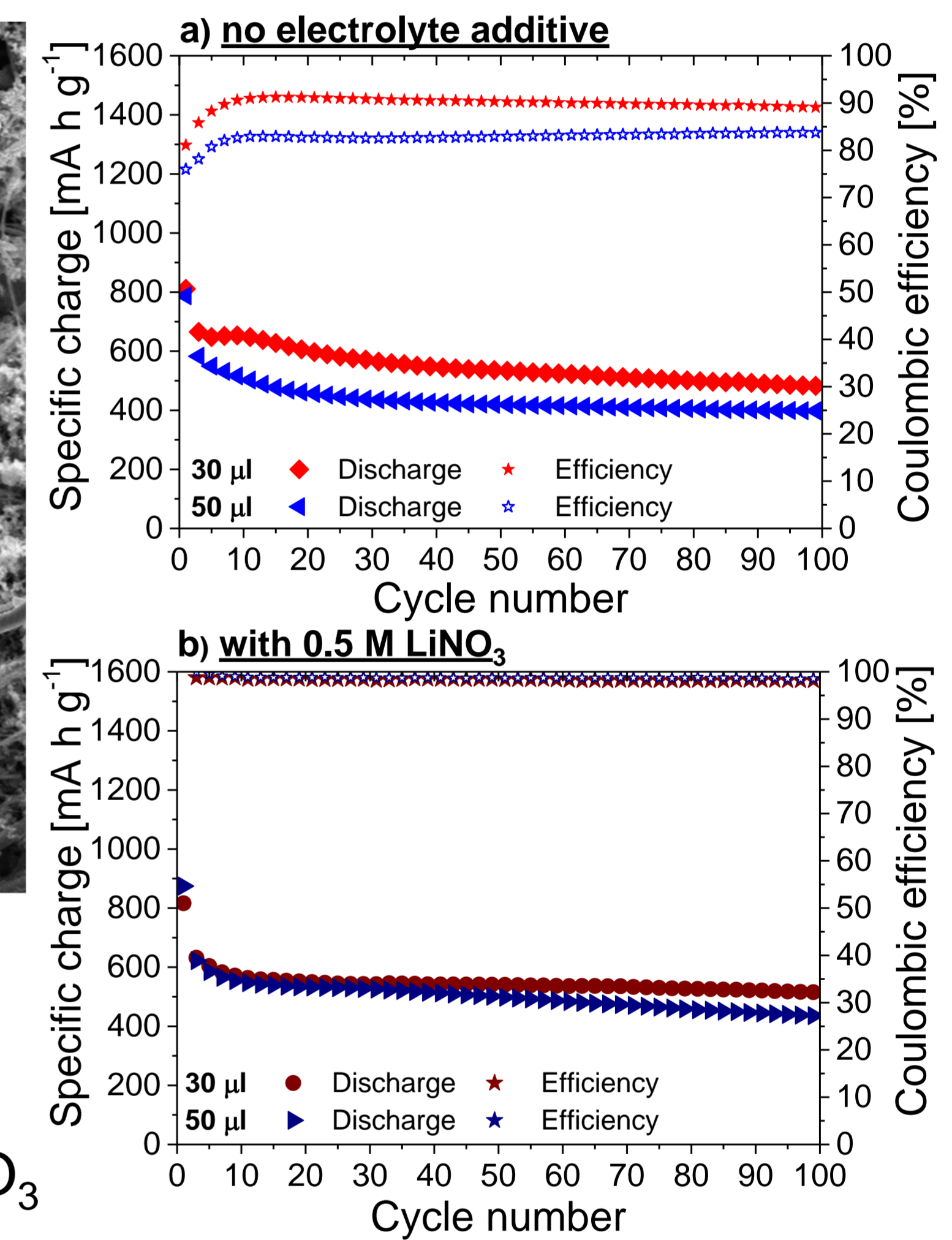


Electrolyte and Electrode Additives

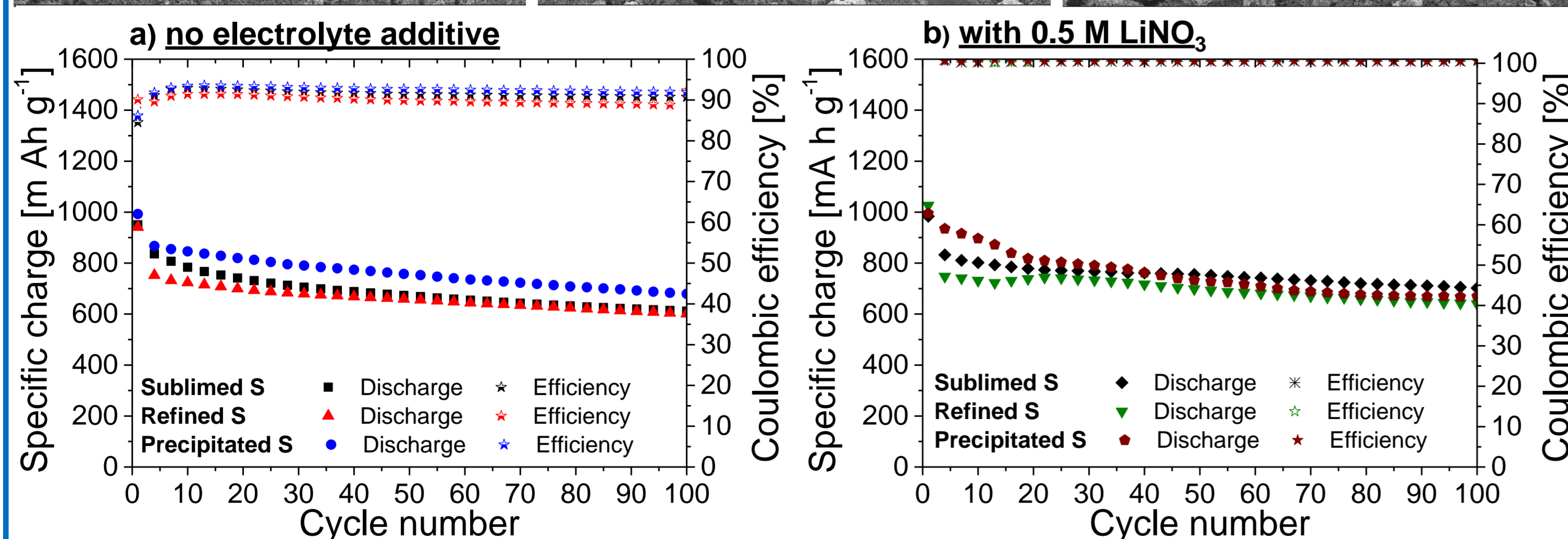
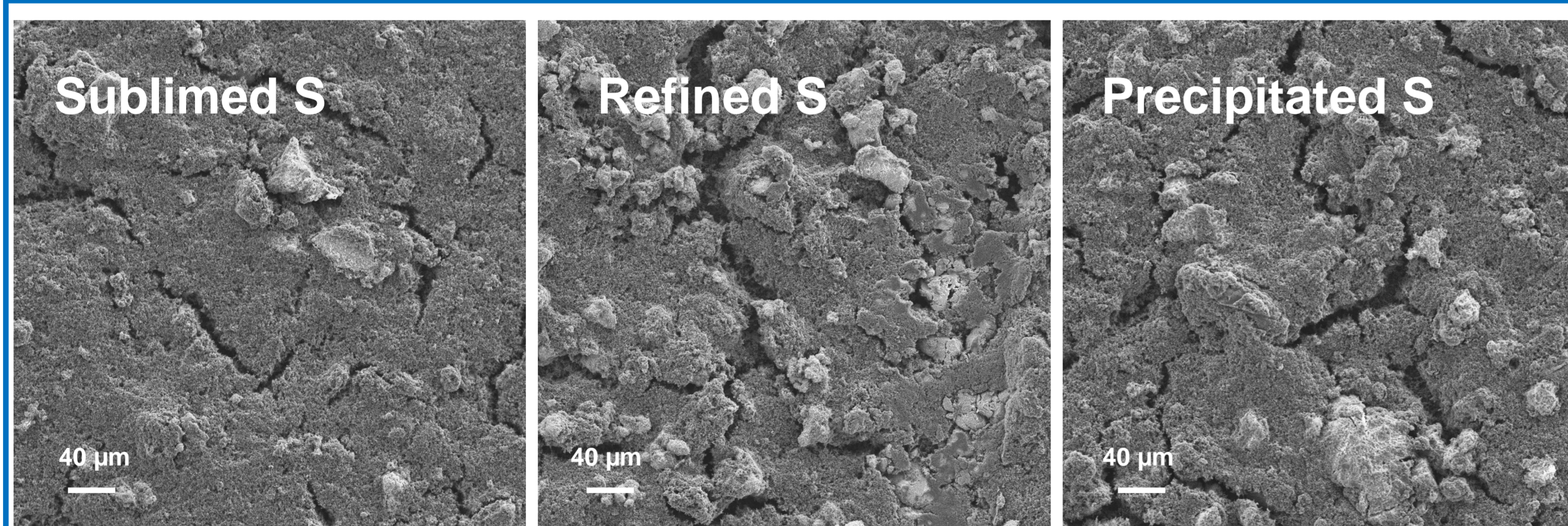


Electrode conductive additive:
Graphitized carbon nanofibres

Electrolyte additive: 0.5 M LiNO₃

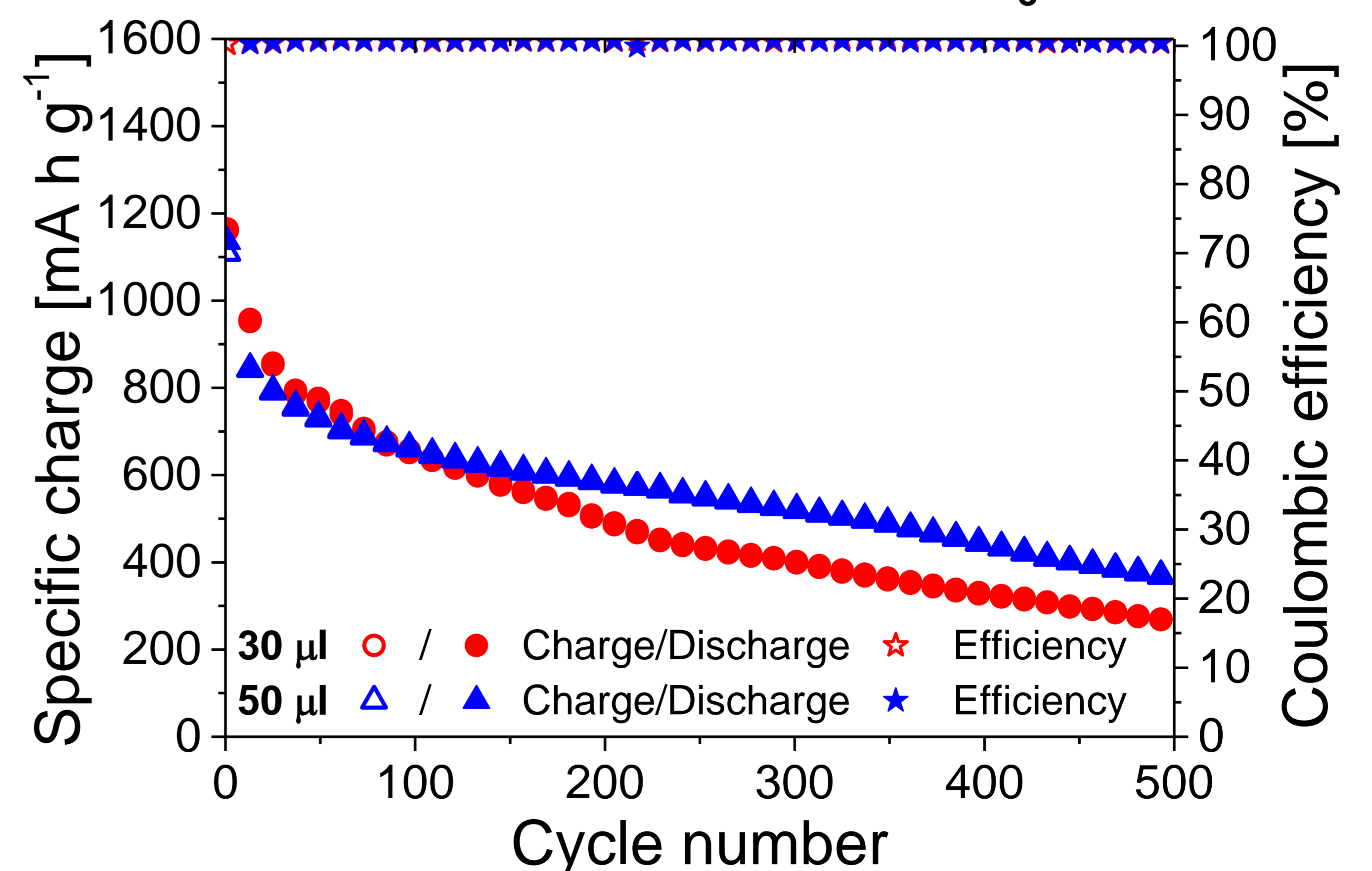


Sulphur Type



Long Term Cycling

500 cycles, 0.5M LiNO₃



Concluding Remarks

The amount of electrolyte, the presence of electrolyte additives and the salt concentration are the most crucial and influential factors. Other parameters, which are previously claimed to have a high impact on performance among them sulphur particle-size, binder type and the presence of conductive additives to the electrode did not significantly influence the performance results of our Li-S cells.

Results suggest that parameters related to the electrolyte are more important for improving the overall performance than those concerning the electrode structure.

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