ALTERNATIVE BINDERS FOR LITHIUM IRON SILICATE (Li_2FeSiO_4) CATHODES

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The vast increase in the use of portable electronic devices over the last decade has multiplied the demand for rechargeable lithium-ion batteries. While increasing the energy density of such batteries has been the main target, there is an increasing concern about the environmental impact regarding the production and recycling of Li-ion batteries. The interest in adopting battery materials environmentally more sustainable, such as iron-based, has therefore been expected. Beside the active material, however, the rest of the cell components need to be revised as well with sustainability in mind.
Here, we investigate greener cell chemistries, such as fluorine-free binders and non-aromatic solvents for a cathode material with low environmental footprint: Li_2FeSiO_4. [1]. The alternative fluorine-free binders studied here are poly(ethylene oxide) (PEO), a cellulose-based ETHOCELL™ and poly(vinylpyrrolidone) (PVP) polymers instead of the conventional PVdF-HFP [2,3].
The electrodes have been cycled in half cells using 1M LiTFSI electrolyte salt in EC:DEC at 60 °C under different C-rates. The performance of the electrodes with fluorine-free binders is similar to that of the one based on PVdF showing good capacity retention under such demanding cycling conditions (Fig. 1).

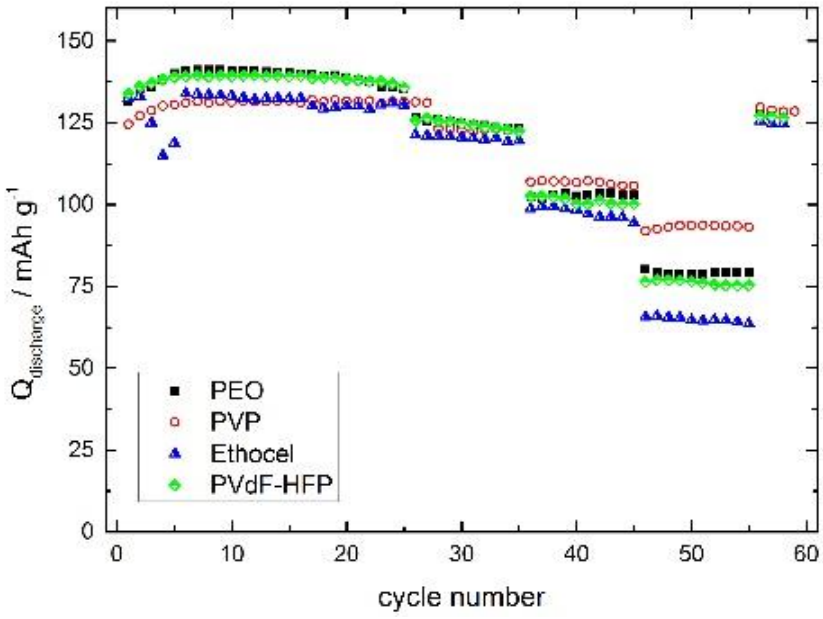

Figure 1, Capacity retention for Li_2FeSiO_4 electrodes made of different binders.

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