

Electronic Supplementary Information (ESI)

Ultrasmall nanocrystalline CeO₂ Fillers Improving the Performance of PVDF-based Polymer Electrolytes for Lithium Metal Batteries

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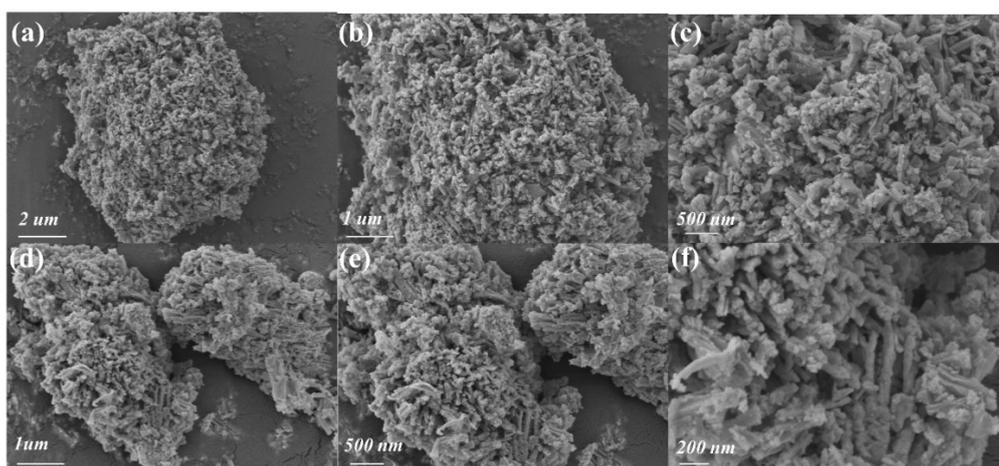


Fig. S1 SEM tests of Ce-MOFs derived CeO₂ at different magnifications (a-c) UNC-CeO₂-0.5, (d-f) NC-CeO₂.

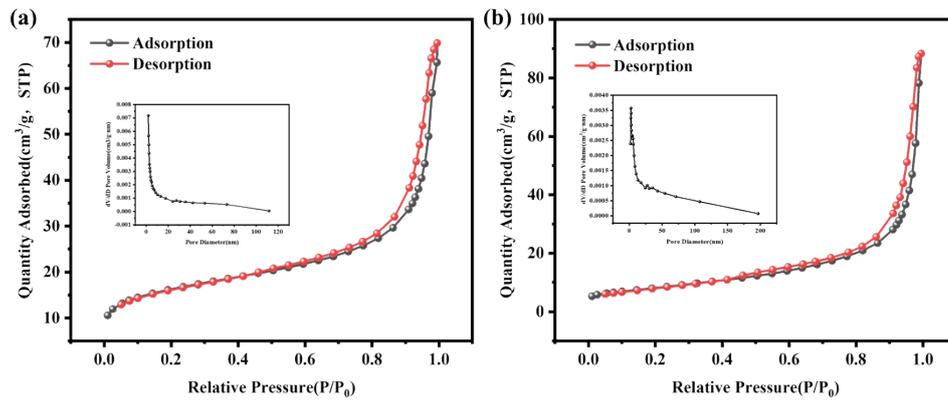


Fig. S2 (a) Nitrogen adsorption-desorption isotherm and pore size distribution of UNC-CeO₂-0.5, (b) Nitrogen adsorption-desorption isotherm and pore size distribution of NC-CeO₂.

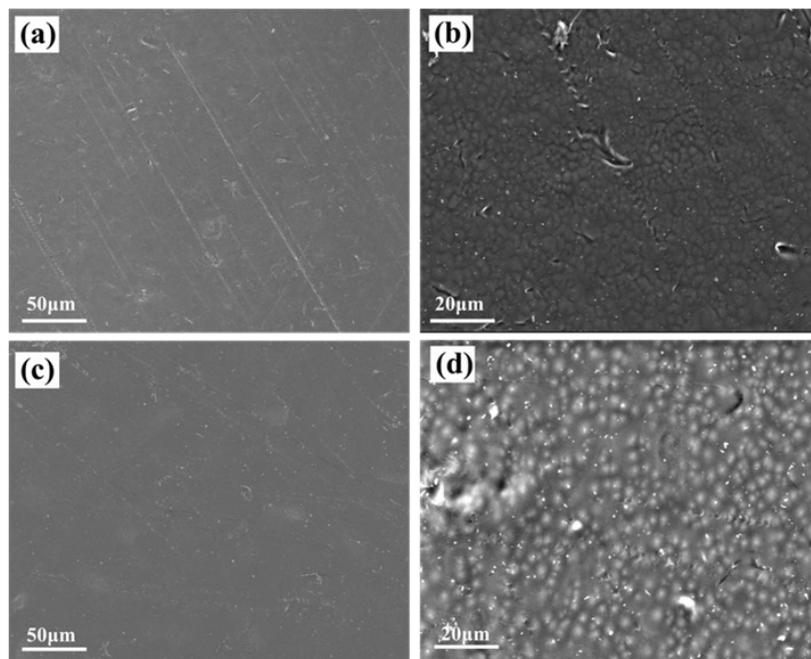


Fig. S3 (a-b) SEM images of PE-NC-CeO₂ films, (c-d) SEM images of PE-UNC-CeO₂-0.5 films.

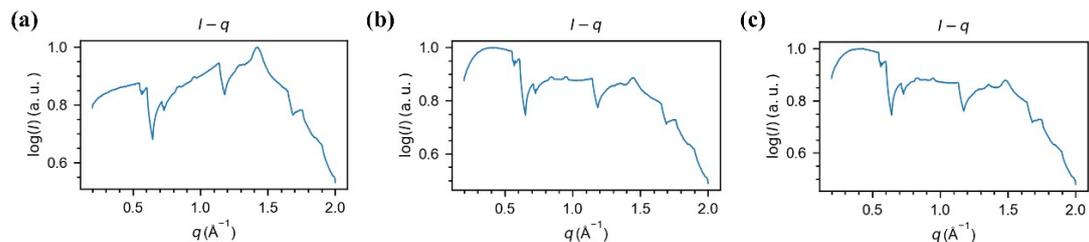


Fig. S4 One-dimensional GIWAXS mapping of (a) PE-PVDF-HFP film, (b) PE-NC-CeO₂- film, (c) PE-UNC-CeO₂-0.5 film.

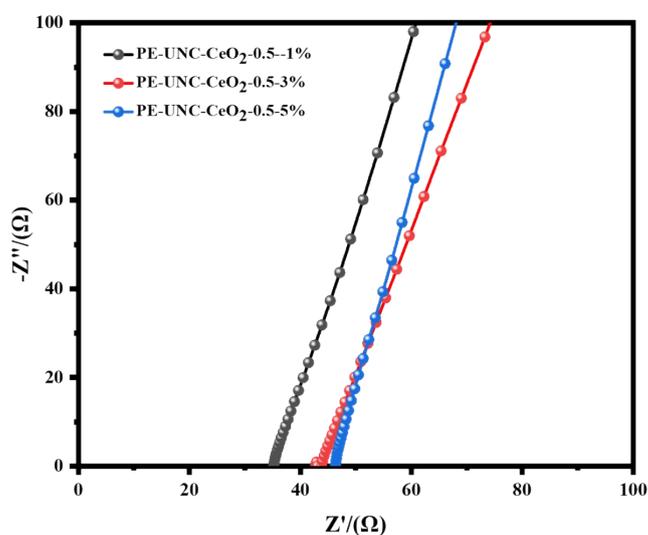


Fig. S5 Impedance plots with the addition of different proportions of UNC-CeO₂-0.5 composite electrolyte.

Table S1 Ionic conductivity of Ce-MOFs derived CeO₂ polymer electrolytes.

Electrolyte	Ionic conductivity (S cm ⁻¹)
PE-NC-CeO ₂ -1%	3.68*10 ⁻⁴
PE-UNC-CeO ₂ -0.01-1%	2.25*10 ⁻⁴
PE-UNC-CeO ₂ -0.1-1%	3.17*10 ⁻⁴
PE-UNC-CeO ₂ -0.5-1%	5.04*10 ⁻⁴
PE-UNC-CeO ₂ -1-1%	4.02*10 ⁻⁴

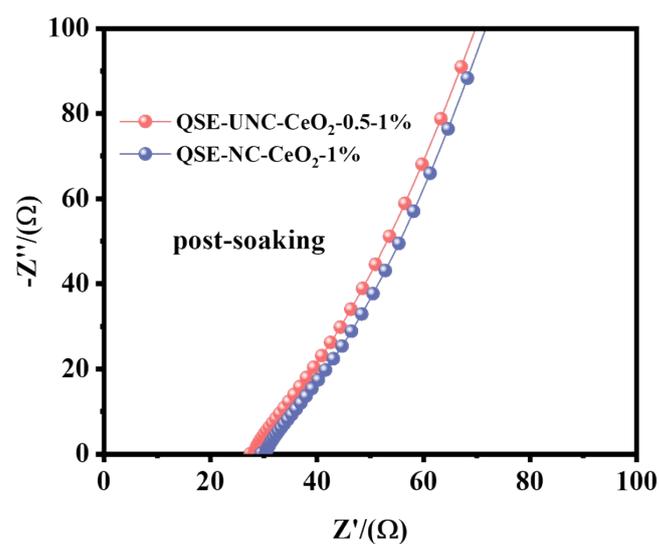


Fig. S6 Impedance plots of post-soaking polymer electrolytes.

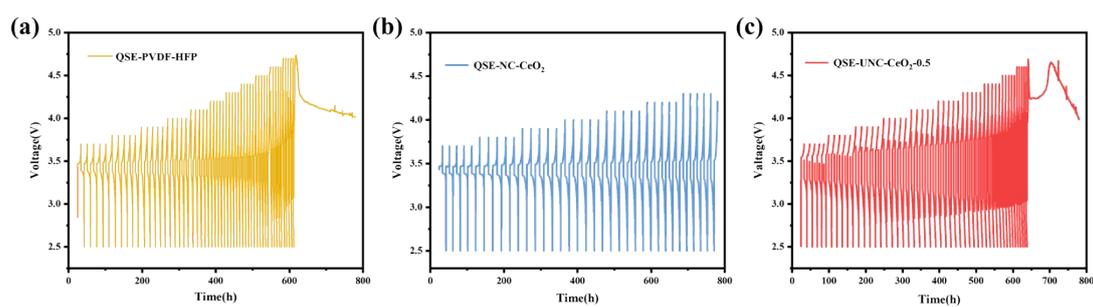


Fig. S7 CICC tests (a) QSE-PVDF-HFP, (b) QSE-NC-CeO₂, (c) QSE-UNC-CeO₂-0.5.

Table S2 Melt enthalpy changes and crystallinity of polymer electrolytes.

Electrolyte	Melting Enthalpy Change (J g ⁻¹)	Proportion (PVD F-HFP)	Crystallinity (%)
QSE- NC-CeO ₂ -1%	10.02	60.5	15.8
QSE- UNC-CeO ₂ -0.5-1%	8.21	60.5	12.9
QSE-PVDF-HFP	13.96	67.0	19.9

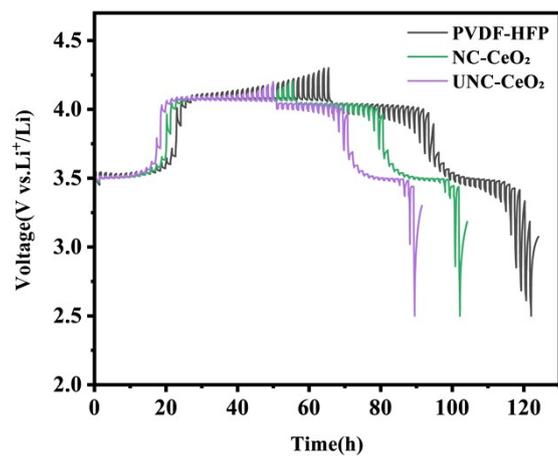


Fig. S8 GITT measurements for QSE-PVDF-HFP, QSE-NC-CeO₂, and QSE-UNC-CeO₂-0.5.