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**Control ion transport by tuning the crystalline morphology in polyethylene oxide-based solid electrolyte** SHAN CHENG, CHRISTOPHER LI, DERRICK SMITH, Drexel University — The crystalline structure of polyethylene oxide (PEO) strongly affects the ion transport in solid PEO-Lithium salt electrolytes. Four possible phases can exist in a PEO-LiClO<sub>4</sub> electrolyte membrane, e.g. crystalline PEO, amorphous PEO, amorphous PEO-Li complex and crystalline PEO-Li complex. It has been widely accepted so far that ion can transport through either amorphous PEO phase or PEO-Li crystalline complex phase. The ion conduction mechanism of the former is based on ion hopping as well as PEO segment motion. In the latter case two PEO chains form cylindrical channels within which Lithium cation can transport. In this presentation, we will show that tuning the crystalline morphology can optimize ion conduction. This can be achieved by controlling the orientation of the PEO lamellae as well as PEO-Li crystalline complex to optimize the ion conducting pathways.

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