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### Title

(Invited) Local Structure of Glassy Lithium Phosphorus Oxynitride (LION) Thin Films and Their Interphases with Lithium Metal Anode

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Meng, Shirley Shirley

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# ***(Invited)* Local Structure of Glassy Lithium Phosphorus Oxynitride (LiPON) Thin Films and Their Interphases with Lithium Metal Anode**

Ying Shirley Meng<sup>1\*</sup>

<sup>1</sup> University of California, San Diego

## **Abstract**

Lithium phosphorus oxynitride (LiPON) is a well-known solid-state lithium ion conductor generally produced through the amorphization of lithium phosphate in the presence of nitrogen. Despite its modest ionic conductivity, it remains popular due to its cyclability against lithium metal anodes. The nature of a stable interface between LiPON and Li metal remains elusive due to the difficulty in understanding and characterizing the buried, highly reactive and beam-sensitive interface. Here we successfully preserve and probe the Li/LiPON interface by cryogenic electron microscopy (cryo-EM), on a sample capable of long-term cycling. The chemical and structural evolution along this interface is observed. A reaction mechanism for Li/LiPON interface is proposed based on the observations.