OAK RIDGE NATIONAL LABORATORY
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Lithiated and Passivated Lithium Ion Battery Anodes

Disclosure Number

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Technology Summary

The present invention ensures a more robust and long-lived Li-ion battery while also reducing the costs associated with pre-sale formation cycles. Battery grade anode materials, including graphite, silicon, and MXene phases, can be pre-lithiated to controlled compositions with efficient and dry processing through mechanochemical processing. Using a UV curable binder, a porous electrode is formed without exposing the lithiated electrode materials to solvents that may alter the composition or damage the passivation coating. A well-controlled SEI can be formed on either the lithiated powder or a porous electrode formed of the lithiated powder using chemical reactions with vapor or solution reactants. With a well formed and uniform SEI protection, the lithiated graphite and other anodes are stabilized enabling processing in a dry room facility. Ex situ formation of an effective SEI also widens the choice of solvents and salts used in the liquid electrolyte in the battery. Penetration of the UV radiation, used to cure the binder, can be enhanced by careful choice of the color and reflectivity of the anode particles achieved by control of the lithium content or by applying a thin reflective coating. Deeper and more uniform UV irradiation allows for the formation of thicker electrodes.

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