

The pyridinic-to-graphitic conformational change of nitrogen of g-C₃N₄ on lithium coordination during lithium plating

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The reversibility of Li plating/stripping should be guaranteed in Li metal batteries. Seriously polarized Li growth during plating leads to the dendritic evolution of Li metal due to the uneven current distribution on the electrically conductive surface. Artificial protective layers covering electrodes have been used to uniformly distribute the current density at the conductive surface. Herein, we incorporated an active ingredient to attract Li ions into the dendrite-suppressing layer. Pyridinic nitrogen of graphitic carbon nitride (g-C₃N₄) served as the Li ion affinity center. Conformation of the nitrogen was changed from pyridinic to graphitic in the presence of Li ions, confirming the coordination of Li ion to the pyridinic nitrogen. Li metal was plated between the g-C₃N₄ layer and the copper current collector/the Li metal. The homogeneous Li nucleation expected from the pyridinic nitrogen on regulating ionic pathways suppressed the Li dendrite formation and decreased the overpotential of the initial Li metal nucleation. Due to the top-down ion flux regulation on the uppermost surface of Li metal, the reversibility of Li plating/stripping was dramatically improved.