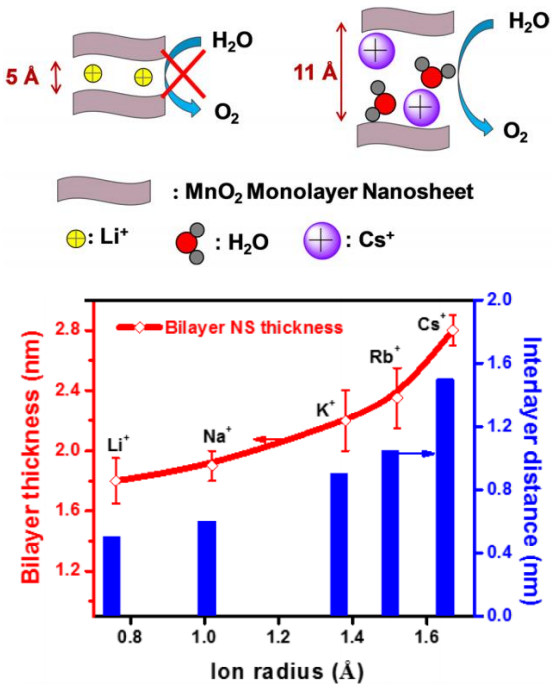
Effect of Interlayer Spacing on the Activity of Layered Manganese Oxide Bilayer Catalysts for the Oxygen Evolution Reaction



Qing Kang, Loranne Vernisse, Richard C. Remsing, Akila C. Thenuwara, Samantha L. Shumlas, Ian G. McKendry, Michael L. Klein, Eric Borguet, Michael J. Zdilla and Daniel R. Strongin, *JACS* 139(5), p.1863. (2017).

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Scientific Achievement

Established an correlation between the electrocatalytic activity of ultrathin bilayer manganese oxide catalysts with interlayer spacing for the oxygen evolution reaction (OER).

Significance and Impact

Interlayer spacing of bilayer manganese oxide was controlled by layer by layer assembly of ultrathin nanosheets in the presence of different alkali ions. In the case of a large alkali metal cation, such as Cs^+ , the interlayer spacing is larger than in the bulk layered manganese oxides, such as birnessite and buserite. Kinetic parameters (η and Tafel slope) associated with largest interlayer(with Cs^+) for the OER were superior to that of the bulk birnessite phase, highlighting the structural uniqueness of these nanoscale assemblies.

Research Details

- Ultrathin manganese oxide bilayer structures with variable interlayer spacing was archived by layer-by-layer assembly with different alkali ions.
- The thermodynamic origins of these bilayer heights were investigated using molecular dynamics simulations.
- Electrochemical investigation revealed that the larger the interlayer spacing, the greater the catalytic OER activity of the bilayer manganese oxide assembly.

Work was performed at Temple University

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