Enhancing Catalytic Activity by High-Entropy Bandgap Enginering

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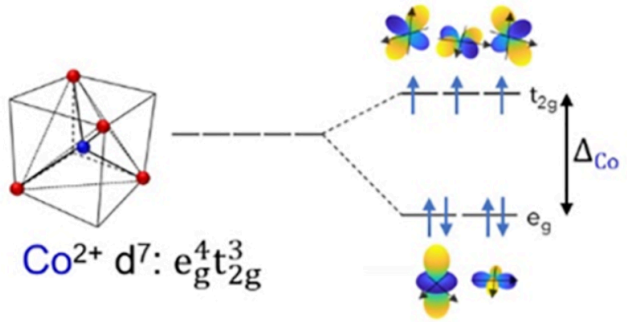
A high-entropy ceramic with five different cations $(Fe_{0.2}Co_{0.2}Ni_{0.2}Cu_{0.2}Zn_{0.2})Al_2O_4$ was fabricated by a MRSEC team using powder processing. These cations span a range of electronegativities and local structural distortions. The diversity in elemental electronegativity and orbital interactions enables the material's bandgap to be reduced below those of any of the parent phases, affording the possibility to maximize solar absorption and electrocatalytic performance.

This new high-entropy ceramic discovered by the MRSEC team can promote electrochemical water splitting at higher rate than state-of-the-art IrO_2 electrocatalysts at comparable overpotential and potentially lower production cost.

Large local distortion with Co



Smaller local distortion with Cu