Thermal Conductivity Study in Oxygen Deficient Perovskites $Ca_{2-x}Sr_xFeCoO_{6-\delta}$ (x = 0,2)

Amara Martinson

Environmental Science Department, United Tribes Technical College, Bismarck, ND

Dr. Ram Hona

Environmental Science Department, United Tribes Technical College, Bismarck, ND

Abstract:

We report low thermal conductivity of two perovskite oxide materials, $Sr_2FeCoO_{6-\delta}$ and $Ca_2FeCoO_{6-\delta}$. The perovskite oxides, $Sr_2FeCoO_{6-\delta}$ and $Ca_2FeCoO_{6-\delta}$ have garnered significant importance due to their remarkably low thermal conductivity of 0.5 W/m/K and 0.05 W/m/K. This unique property positions $Sr_2FeCoO_{6-\delta}$ and $Ca_2FeCoO_{6-\delta}$ as promising materials for applications requiring effective thermal insulation. In fields such as electronics, thermoelectrics, and aerospace devices, where efficient heat management is critical, the utilization of materials with low thermal conductivity becomes pivotal. The perovskite structure of $Sr_2FeCoO_{6-\delta}$ and $Ca_2FeCoO_{6-\delta}$, coupled with the presence of oxygen vacancies, contributes to this noteworthy thermal insulation characteristic. The material's ability to impede the transfer of heat makes it a valuable candidate for electronic devices, where heat dissipation is crucial for optimal performance and longevity. Furthermore, their potential application in thermoelectric devices, benefiting from the advantageous interplay between thermal and electrical properties, underscores the significance of $Sr_2FeCoO_{6-\delta}$ and $Ca_2FeCoO_{6-\delta}$ in advancing energy conversion technologies. The exploration of such materials with low thermal conductivity opens avenues for enhanced energy efficiency, reduced heat-related issues in electronic systems, and broader advancements in thermal management across diverse technological domains.