Designing and modifying perovskites for potential applications in hard coal combustion through chemical looping

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A promising chemical looping combustion method may offer a solution for achieving carbon dioxide neutrality during energy generation. It provides a potential carbon dioxide sequestration-ready stream and significantly reduces nitrogen oxide emissions. This can be accomplished when an oxygen carrier (OC), which acts as a medium for transferring oxygen between fuel and air reactors during combustion, is processed. It should exhibit appropriate oxygen transport capacity, excellent fuel reactivity, and sufficient mechanical strength.
This work employs a family of iron-manganese-based perovskite oxygen carriers for selected coal combustion. FTIR and XRD analyses focused heavily on their structural properties and confirmed their qualities.
The OCs' reactivity toward selected fuels was evaluated using a thermogravimetric analyser coupled with a quadrupole mass spectrometer (TGA-QMS). X-ray powder diffraction (XRD) proved their good regeneration ability and potential for reuse.
In summary, the research has demonstrated that applying mixed metal oxides through chemical looping could be a potential pathway to achieving net carbon dioxide neutrality during power production from coal.

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