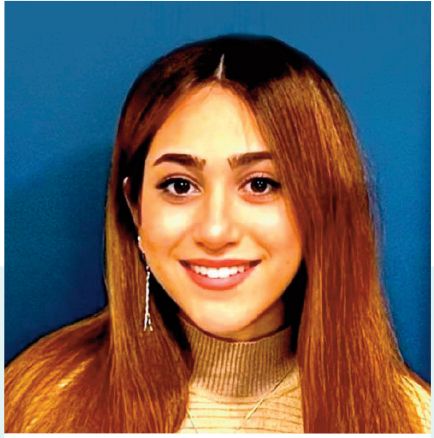
POSTER EXPOSITION

Swansea University Prifysgol Abertawe

Poster 12

Capture and reduction of carbon emissions to maximize circularity in the steelmaking process



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ABSTRACT:
Emissions of carbon monoxide and carbon dioxide from Blast Furnace Gas, Basic Oxygen Furnace Gas, and Coke Oven Gas are significant sources. Shifting to a circular economy involves converting these gases into renewable fuels. This research introduces an innovative thermodynamic analysis, evaluating hydrogenating CO2/CO-rich gases along with steel-off gases.

Process design: As synthetic natural gas can be used in integrated steelworks, substituting for natural gas, the direct carbon capture and utilisation using BFG and BOFG as a carbon source and H2-rich COG as a hydrogen source is the focus of this research.

Thermodynamic analysis: The HSC Chemistry software is applied for process simulations of steel-off gas reforming without a catalyst. The study utilised a thermodynamic equilibrium analysis to identify optimal process parameters and reaction conditions. The objective was to enhance CO2 hydrogenation and minimize carbon formation. The findings highlight variations in process gas characteristics, with the most effective operational parameters for maximising methane production involving Coke Oven Gas, CO2-rich gas flow, and a specific temperature range.

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