

Advanced Materials Research Group

project summary

Project Title	Hydrogen Production Through Sorption Enhanced Steam Reforming.
Researcher	Hind Elfaki E-mail: enxhoe@exmail.nottingham.ac.uk .
Project Summary	<p>Sorption enhanced hydrogen production (SEHP) is novel hydrogen generation method. Conventional steam reforming is multi-steps hydrogen production process. It consists of high temperature endothermic reaction (850°C) followed by two stages of low temperature shift reactions (250-450 °C) in order to increase the hydrogen yield. CO₂ removal is needed with additional energy consumption. SEHP combine the previous processes in one step. In addition to this simplicity it shifts the equilibrium reaction towards more ethanol conversion by adding the CO₂ absorbent which results in hydrogen yield increase.</p> <p>The reforming catalysts and CO₂ absorbent catalysts should have good capacities and substantial lifetime over the multiple carbonation/calcination cycles. In this study, preparation of calcium oxide (CaO) mixed with magnesium oxide (MgO) and cerium oxide (CeO₂) as CO₂ absorbent catalysts for sorption enhanced hydrogen production process was done in different weight percentages. Iron-based catalyst will be used as oxygen carrier for the steam reforming. The adsorbents and the catalyst were prepared by Co-precipitation method using isopropyl alcohol with distilled water as precipitant agents. Characterization experiments (Powder X-ray diffraction (XRD), Scanning electron microscopy (SEM), Measurement of Surface Area and Mercury Porosimetry) were done to study the physical and chemical difference between the prepared adsorbents in different weight mixture. The CO₂ absorption capacities and their cyclic stability of the prepared adsorbents were evaluated over TGA experiments.</p>

