Low-temperature and fast kinetics for CO_2 sorption using Li_6WO_6 nanowires

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Abstract

Lithium hexaoxotungstate (Li_6WO_6) nanowires were synthesized via facile solid state reaction and were tested for CO_2 capture application. The CO_2 sorption tests on nanowires were performed under both dry and humidified ambience at a range of low and high temperatures. Under dry conditions the material was able to trap CO_2 efficiently above 430°C. A weight increment of 12% in only 60 seconds duration at 710°C indicates ultra fast reaction kinetics. Moreover, under humidified ambient, the superficially activated lithium tungsten oxide was able to chemically capture CO_2 in an exceptionally fast manner even at temperatures as low as 30-40°C with a weight increment of 7.6% within a time-scale of one minute. It was observed that the CO_2 chemisorption in Li_6WO_6 is exceedingly favored in the oxygen ambience at higher temperatures and in the presence of water vapor at lower temperatures. Nanowire morphology favors the swift lithium supply to the surface of lithium rich Li_6WO_6, thereby enhancing the reaction kinetics. Overall, high chemisorption capacities, superfast reaction kinetics, wide range of operating temperatures and reasonably well recyclability make 1-D Li_6WO_6 highly suitable for commercial CO_2 capture applications.

Biography of Presenter

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