420e Preparation and Performance of Li4sio4-Doped Sorbents for High Temperature CO2 Capture

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Fossil fuels continue to be major energy sources and the reduction of CO_2 emission from energy production is crucial to the stabilization of greenhouse gas concentration in earth atmosphere. High temperature sorbents have gained interests because of the energy and cost savings in removing CO_2 at high temperature in processes such as IGCC. Lithium orthosilicate, or Li_4SiO_4, has been shown to have high CO_2 adsorption capacity and faster kinetics than Li_2ZrO_3 [1]. However, long term stability of the adsorption capacity of Li_4SiO_4 in cyclic operation has not been verified. Attrition of sorbent particles due to volume expansion upon CO_2 uptake and high mobility of lithium are likely to negative impact the life time of Li_4SiO_4 sorbents. In this work various porous substrates, such as porous silica, are doped with Li_4SiO_4 and the resulting sorbents, along with unsupported Li_4SiO_4, are tested for both CO_2 capacity and their durability in cyclic adsorption. Adsorption capacity and kinetics data are presented and the effects of the porous substrates are discussed in terms of both enhanced mass transfer efficiency and sorbent stability.

1. KATO, M., et al., *Carbon dioxide absorption by lithium orthosilicate in a wide range*

of temperature and carbon dioxide concentrations. JOURNAL OF MATERIALS SCIENCE LETTERS, 2002. **21**: p. 485– 487.