CO2 capture using nanoporous TiO(OH)2/tetraethylpentamine

Maryam Irani  
*University Wyoming*

Maohong Fan  
*University of Wyoming*

Khaled Gasema  
*University of Wyoming*

Follow this and additional works at: [http://dc.engconfintl.org/co2_summit2](http://dc.engconfintl.org/co2_summit2)  
Part of the [Environmental Engineering Commons](http://dc.engconfintl.org/co2_summit2)

Recommended Citation  

This Abstract is brought to you for free and open access by the Proceedings at ECI Digital Archives. It has been accepted for inclusion in CO2 Summit II: Technologies and Opportunities by an authorized administrator of ECI Digital Archives. For more information, please contact franco@bepress.com.
In this work, an inorganic-organic CO2 sorbent was prepared by immobilizing tetraethylenepentamine (TEPA) onto nanoporous titanium oxyhydrate (TiO(OH)2). The prepared sorbents were characterized using X-ray diffraction, Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), thermogravimetric analysis (TGA), and Brunauer-Emmett-Teller (BET) analysis. At the optimal TEPA loading of 60 wt.% on TiO(OH)2, its CO2 sorption capacity reached 3.1 mmol CO2/g-sorbent for 1 vol.% CO2 in N2 along with ~1 vol.% H2O at 60°C. Studies of adsorption kinetics and thermodynamics showed that the activation energies for CO2 adsorption and desorption of TiO(OH)2/TEPA are 38.31 kJ/mol and 44.51 kJ/mol, respectively. Its low CO2 desorption activation energy means a high CO2 desorption rate and thus a low CO2 capture cost. The sorbent has the potential to be used for capturing ultra-dilute CO2 from gas mixtures.

Key words: CO2 capture; nanoporous titanium oxyhydrate; sorption; kinetics

*Corresponding author's email address: mfan@uwyo.edu (M. Fan), Tel.: +1 307 766 5633; fax: +1 307 766 6777.