Abstract Submitted
for the BPNMC18 Meeting of
The American Physical Society

Feasibility Studies of Using Dolomite as Thermal Energy Storage for CSP Applications[1] DOMINIC DODSON, MC BEN JOE CHARLES, SHIRLEY GARCIA, SCOTT WALLEN, Florida Polytechnic University, GARY ALBARELLI, BRIAN BIRKY, Florida Industrial and Phosphate Research Institute, FL Polytech University, KATHARINA PFAFF, Colorado School of Mines, SESHA SRINIVASAN, Florida Polytechnic University, COLORADO SCHOOL OF MINES COLLABORATION — Dolomite, calcium magnesium carbonate ($CaMg(CO_3)_2$), is considered an undesirable mined resource for phosphoric acid production in Florida; as such, large quantities of the mineral are available. This study characterized phosphatic high concentration dolomite pebbles received from the Florida Industrial and Phosphate Research Institute (FIPR) and investigated their feasibility for carbon dioxide (CO_2) sequestration and thermochemical energy storage (TCES). The chemical composition of the dolomite minerals was studied using X-ray Fluorescence (XRF), Fourier-transform infrared spectroscopy (FTIR), and Scanning electron microscopy with energy dispersive x-ray spectroscopy (SEM, EDS), which confirmed the phosphatic pebbles received from FIPR contained high percentages of dolomite. Thermogravimetric analysis (TGA) was used to calculate the dolomite mineral activation energy for carbonation and calcination of the dolomite pebbles in Nitrogen (N_2) ambient and CO_2 ambient conditions, respectively, and with temperatures up to 800C. Values important for thermochemical energy storage such as heat capacity and enthalpy of reaction were also calculated using this TGA data. Changes in crystal structure after calcination, carbonation, and wet ball milling of the dolomite minerals were observed using X-ray diffraction (XRD). The effects of wet ball milling to reduce particle size were observed on the cyclic stability and carbonation of the dolomite pebbles. Particle size and surface area were measured using XRD and N_2 adsorption BET methods.

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Date submitted: 19 Oct 2018 Electronic form version 1.4