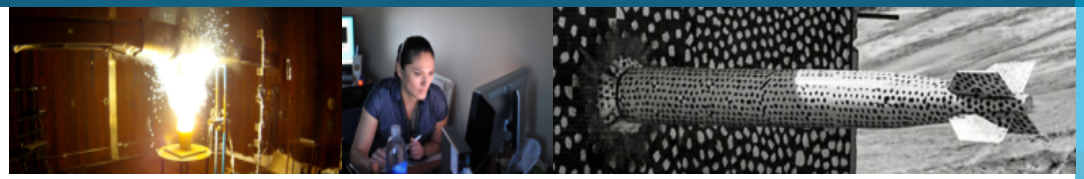
SAND2021-11596PE

NEUP IMEBM Project: Preliminary Solubility Experiments on Bentonite, Basalt and Glass Fibers



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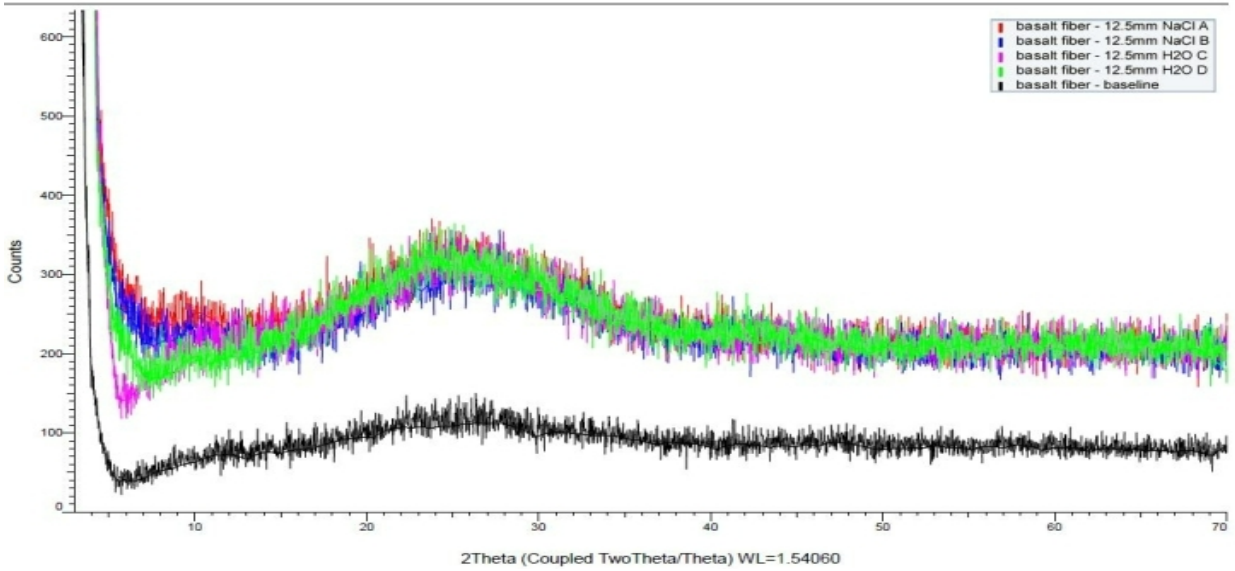
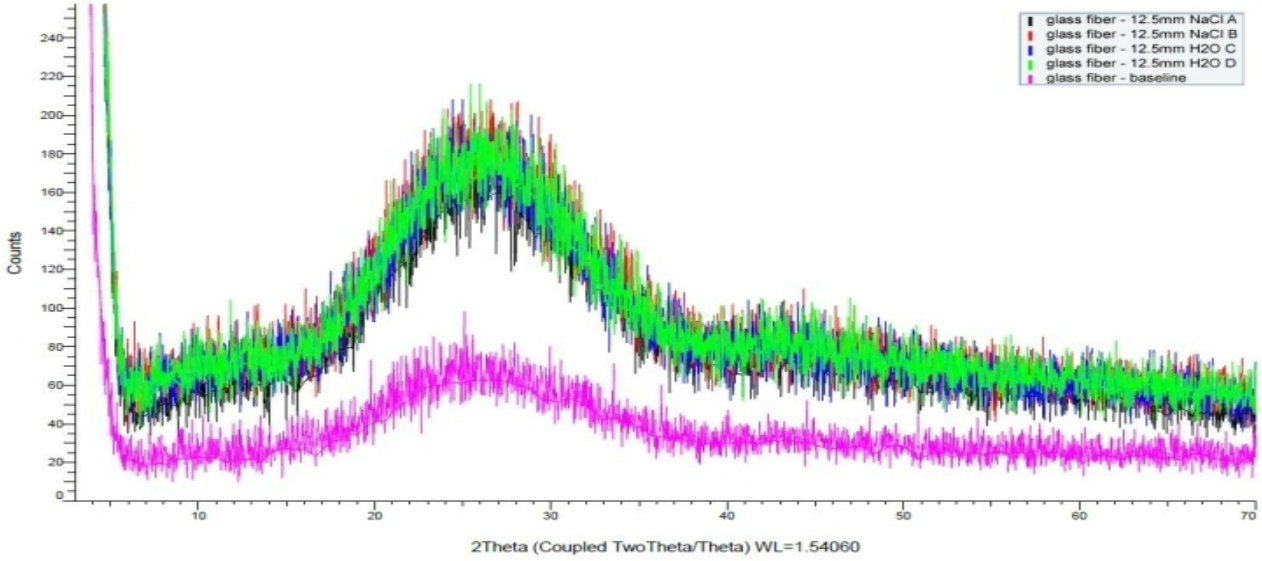
Bentonite Solubility – XRD Analysis

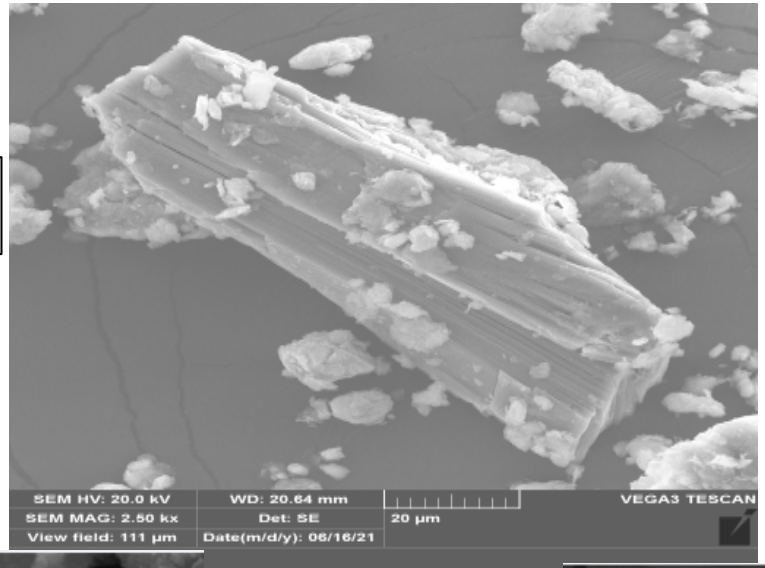
Basalt Fiber Hydrothermal Experiments



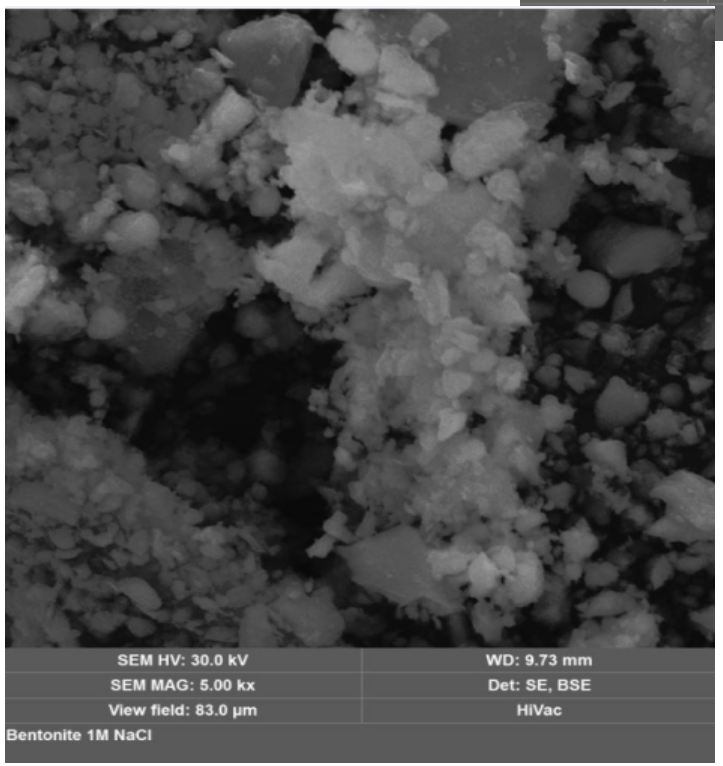
Glass Fiber Hydrothermal Experiments



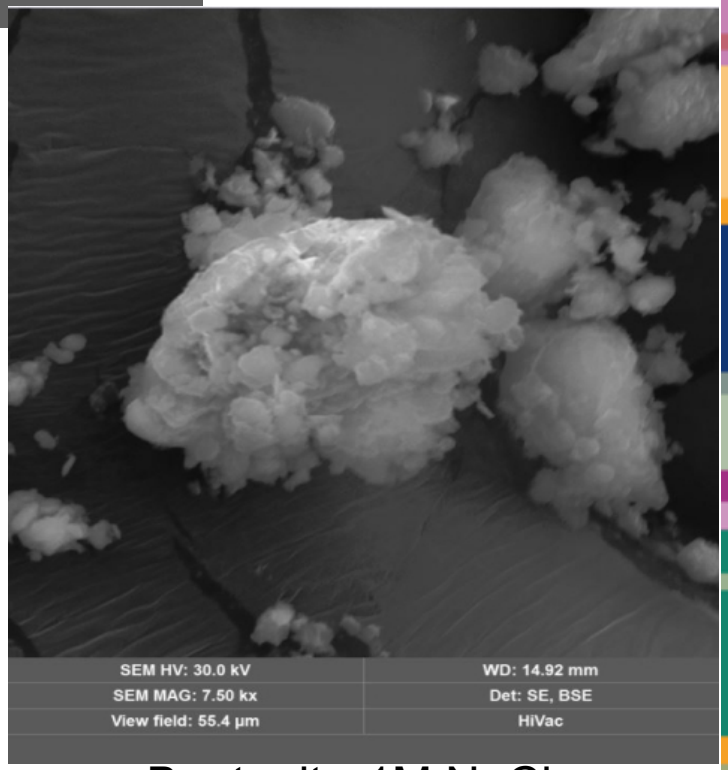
SEM on Bentonite



<75um Bentonite Starting Material



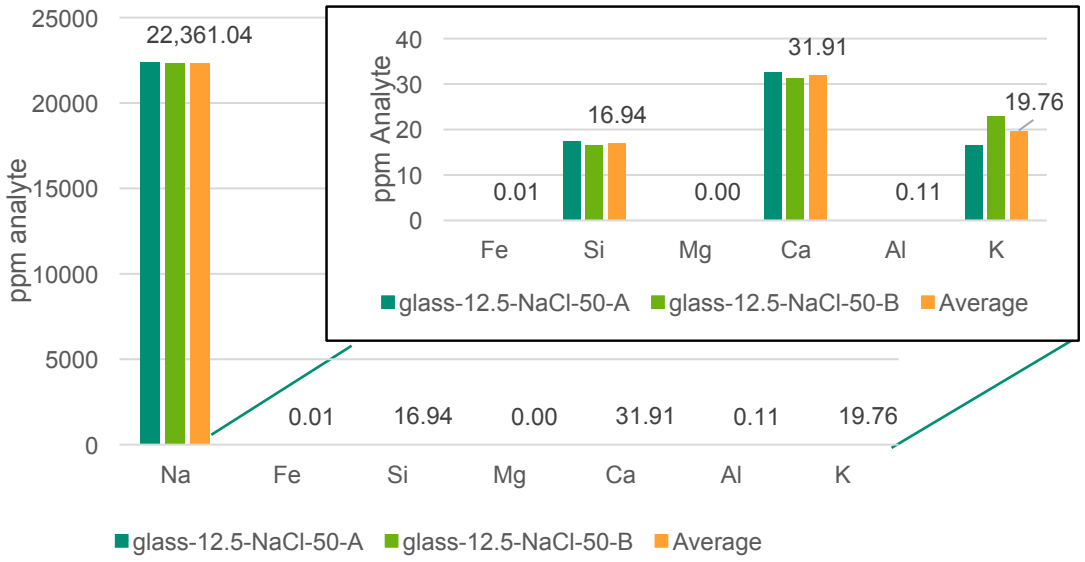
Bentonite-1M NaCl-PVA



Bentonite-1M NaCl-PVA

Solubility Experiments – ICP-OES

Glass Fibers – 1M NaCl



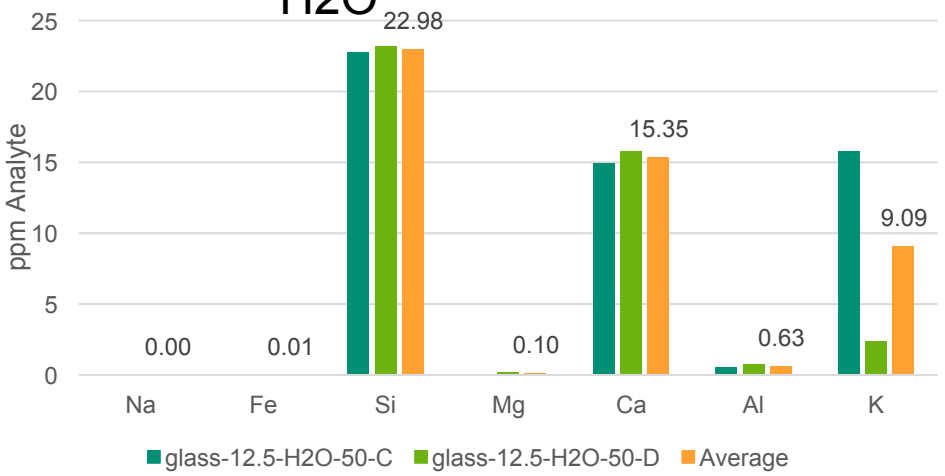
pH Analysis before & after hydrothermal treatment

Vessel #	Sample ID	initial pH	final pH
A	glass fiber-12.5 mm-NaCl-50	7.01	9.14
B	glass fiber-12.5 mm-NaCl-50	7.09	9.1
C	glass fiber-12.5 mm-H2O-50	6.85	9.49
D			

Reactor Solution	initial pH
1M NaCl	6.17
DI H2O	5.92

- Closed system Parr Reactors
- Runs done in duplicates
- 12.5mm glass fiber size
- Experiment duration: 21 days
- Water/liquid ratio: 50
- Temperature: 150°C

Glass Fibers – DI H2O



Future Work

- Geochemical modeling of solute chemistry (EQ3/6)
- XRF analyses on starting material and reaction products
- XRD and SEM analysis on basalt and glass fiber reacted in DI water and 1M NaCl
- Solubility experiments: Carbon fiber in DI water and 1M NaCl
- Experimental design of flow-through reaction experiments on bentonite-fiber mixtures

Sample	Particle/Fiber Size	Reactor Fluid	Water/Rock Ratio	**Reaction Temperature**	Reaction Time
Bentonite	<2µm, <75µm, granules	DI Water / 1M NaCl	50	150 °C	21 days
Glass Fiber	crushed / 12.5 mm	DI Water / 1M NaCl	50	150 °C	21 days
Basalt Fiber	crushed / 12.5 mm	DI Water / 1M NaCl	50	150 °C	21 days
Carbon Fiber	crushed / 12.5 mm	DI Water / 1M NaCl	50	150 °C	21 days