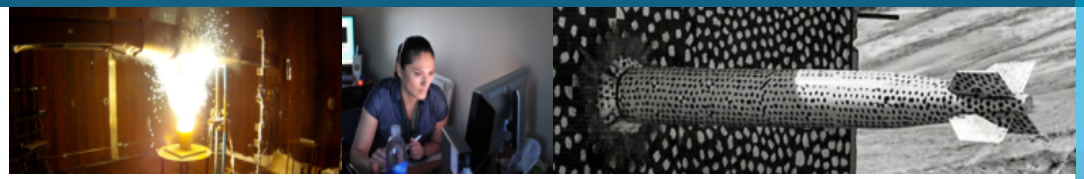
NEUP IMEBM Project: Solubility Experiments on Carbon Fibers, Results from SEM-EDS & XRD



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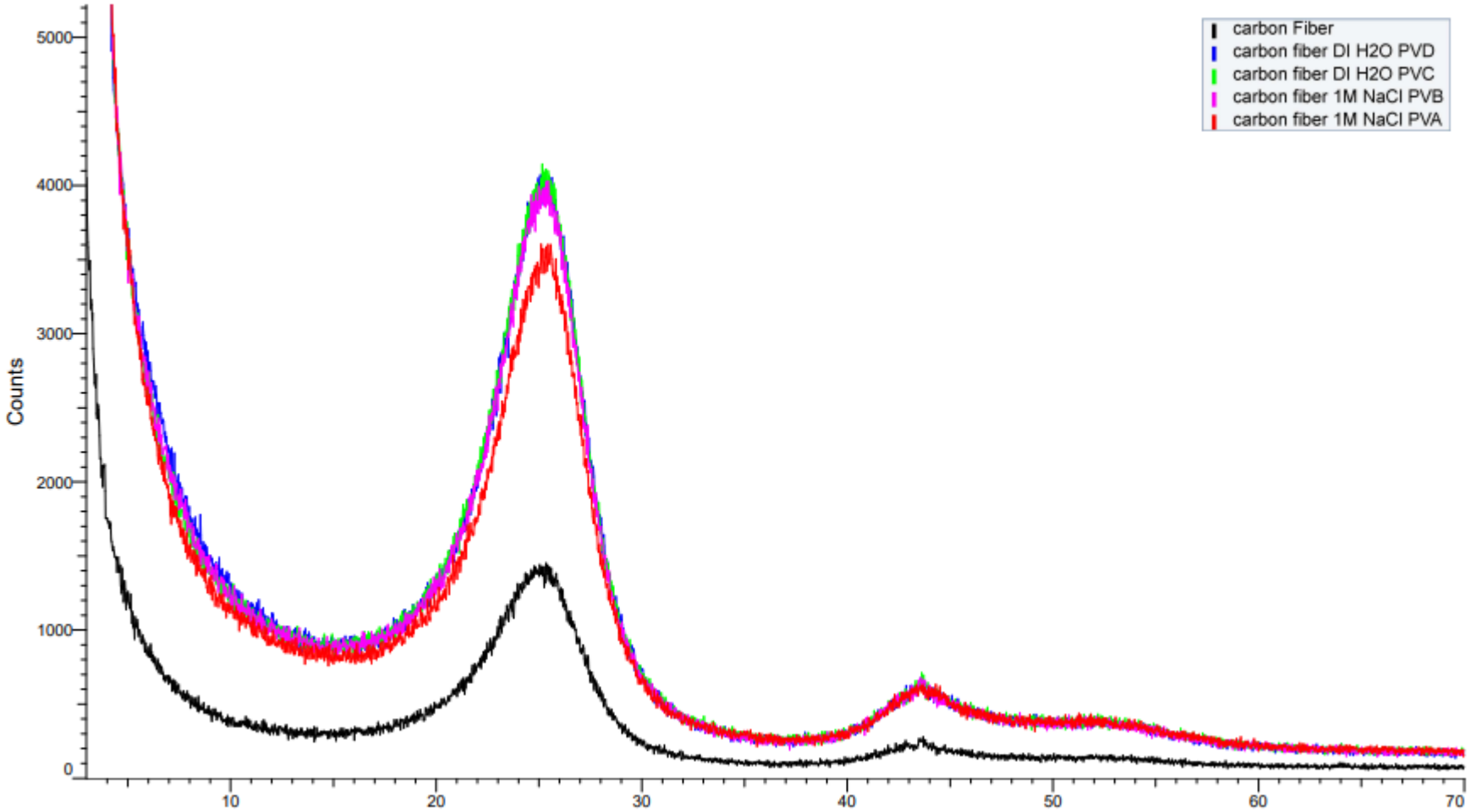
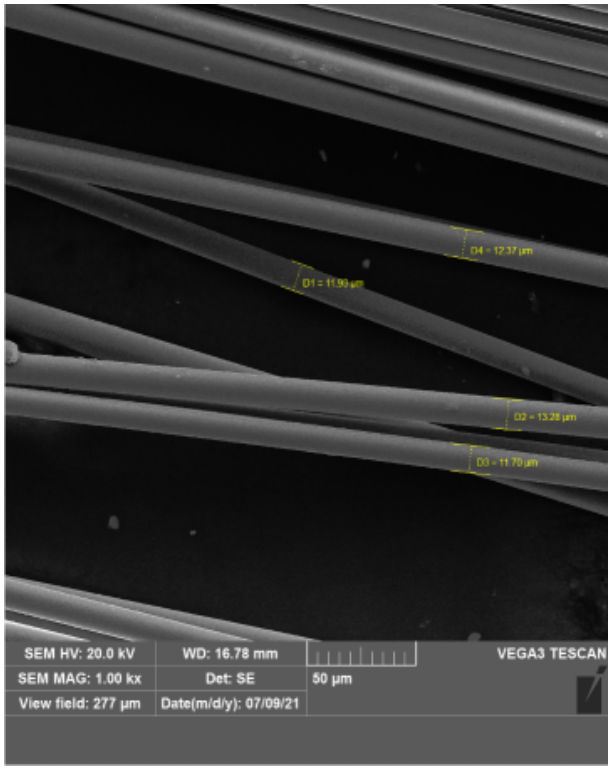
Carbon Fiber Solubility – XRD Analysis

Carbon Fiber Solubility Experiments

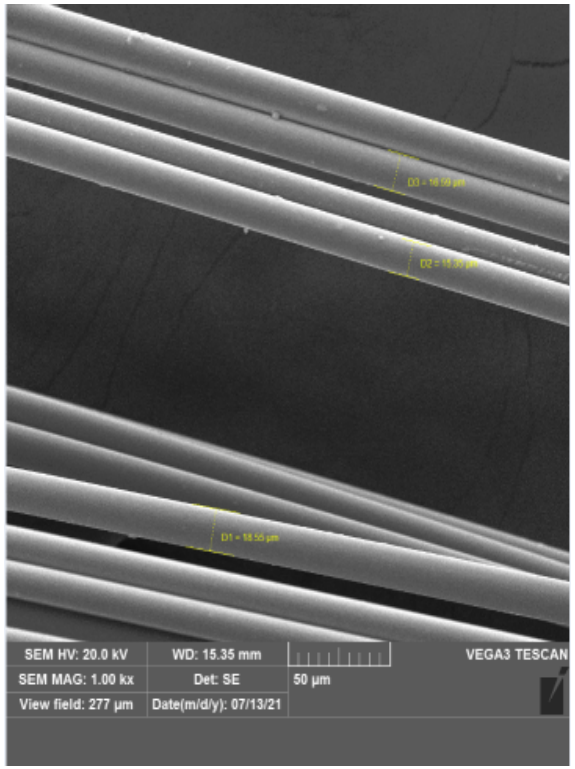


SEM on Starting Material - Fibers



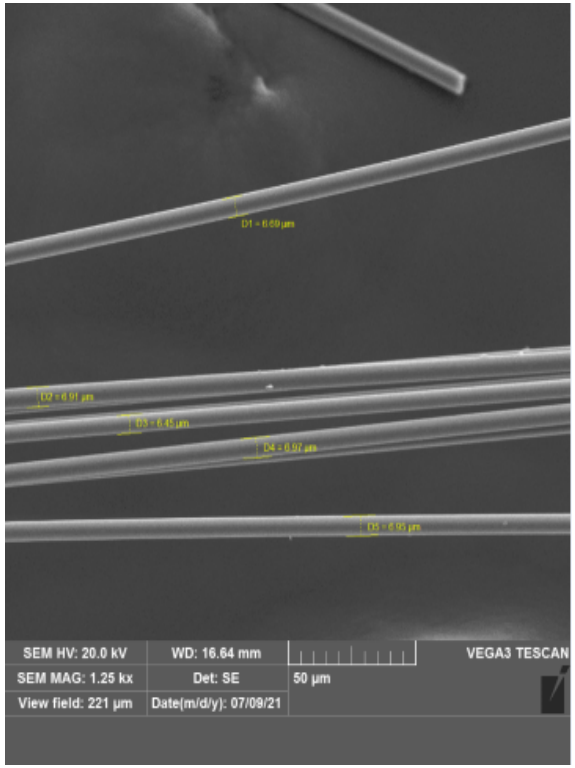
12.5mm Basalt F

$D_{average}$ = 12.32 µm



12.5mm Glass Fiber

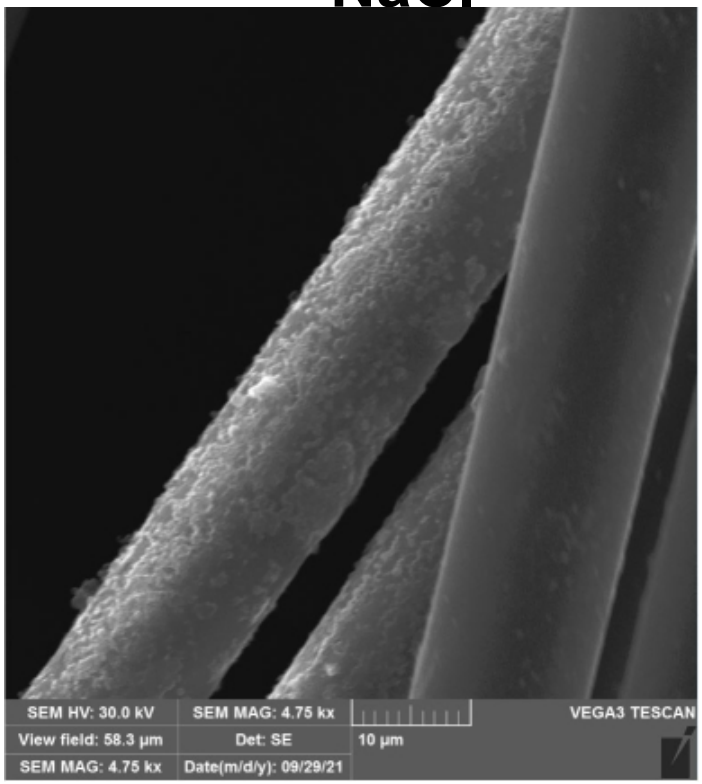
$D_{average}$ = 16.83 µm

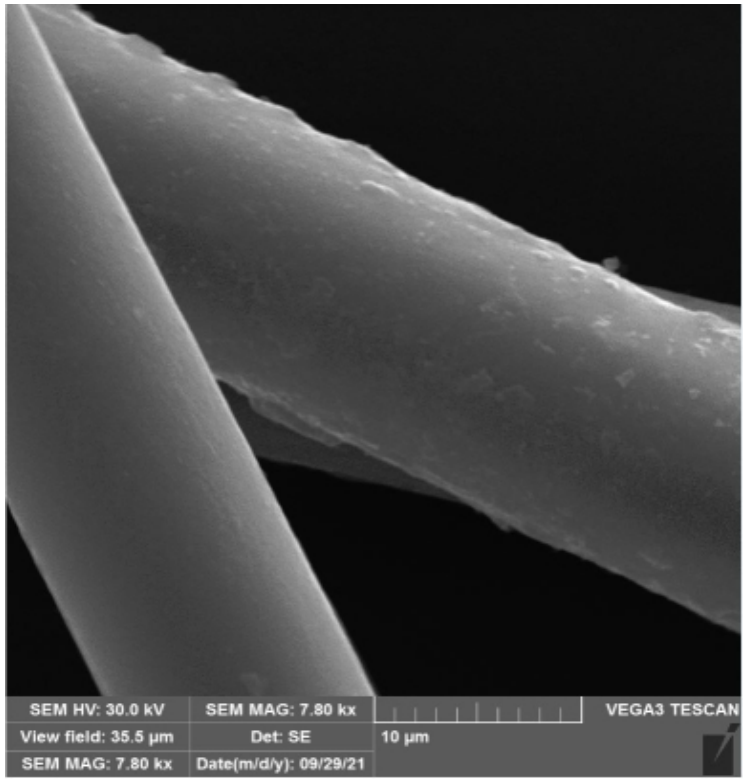


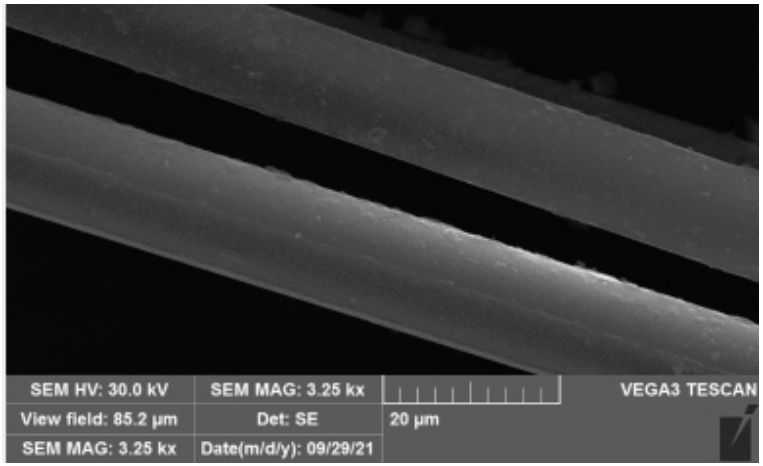
12.5mm C

$D_{average}$ = 6.79 µm

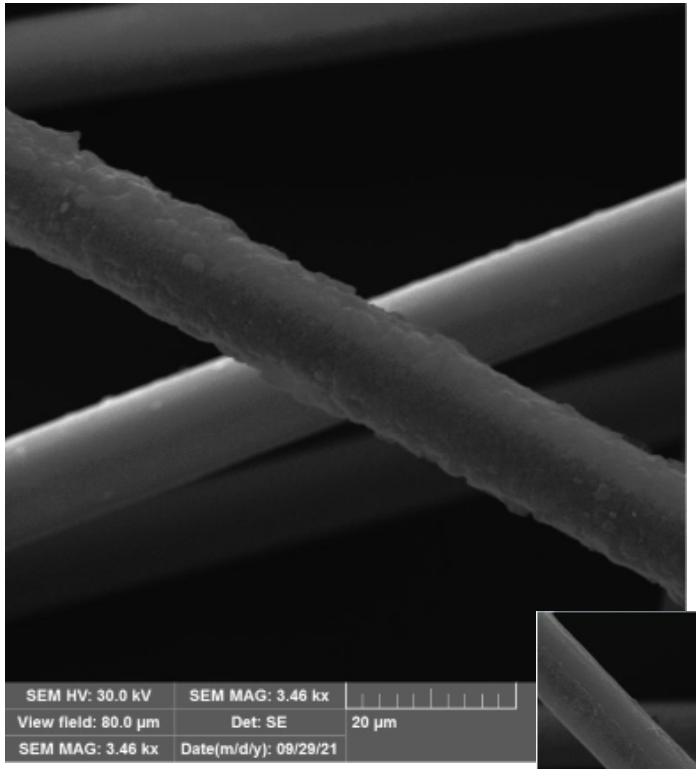
SEM on Basalt Fibers – 1M NaCl

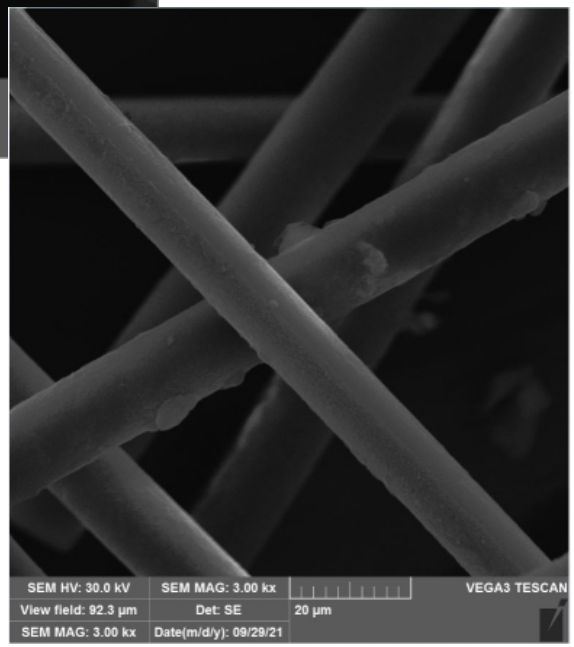


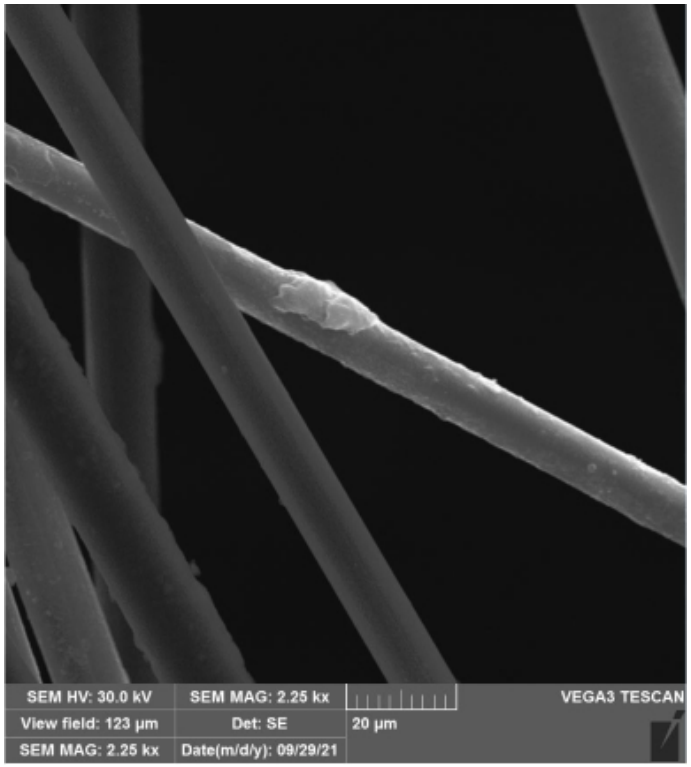




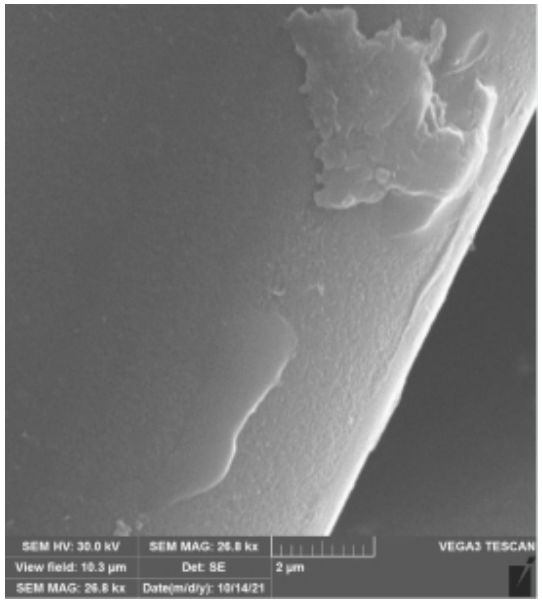
SEM on Basalt Fibers – DI H2O

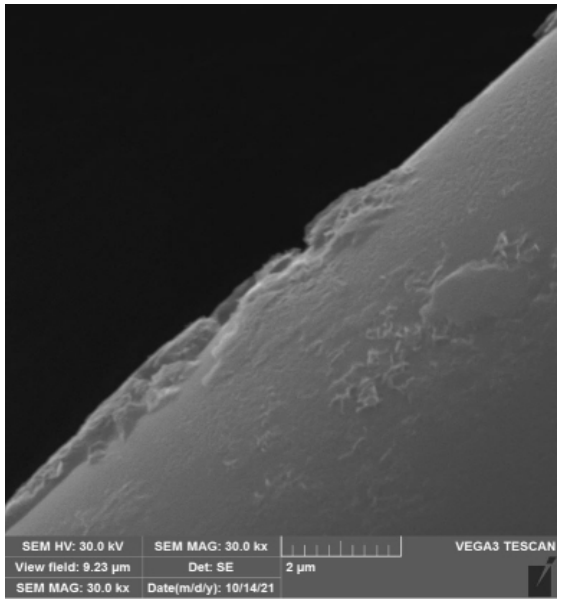


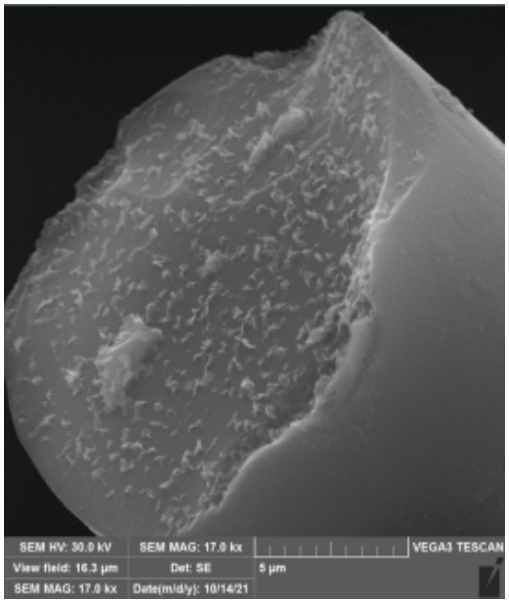


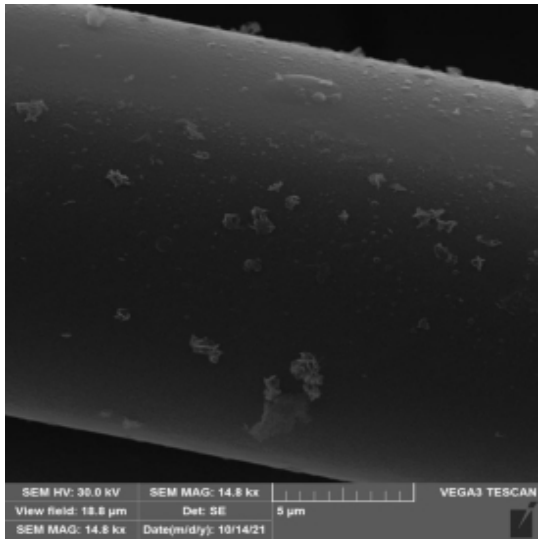


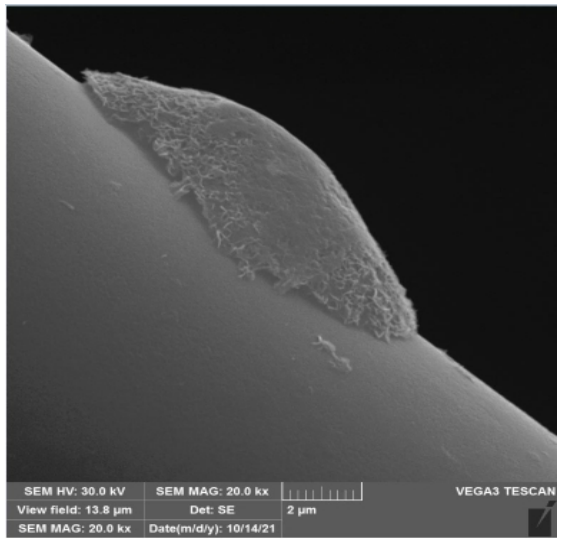
SEM on Glass Fibers – 1M NaCl

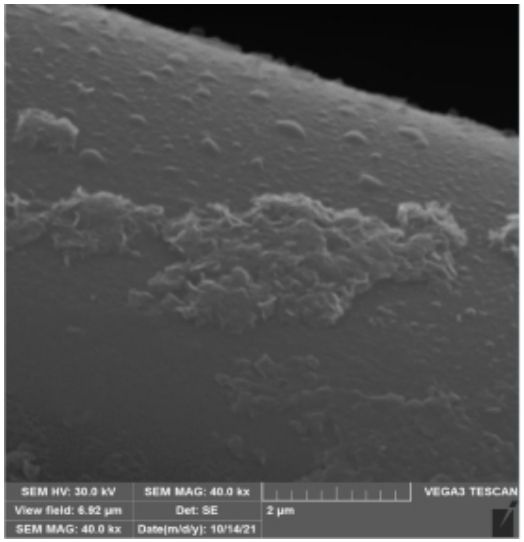




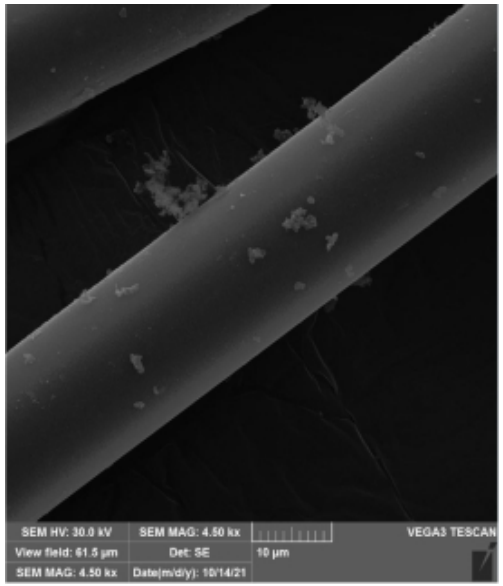


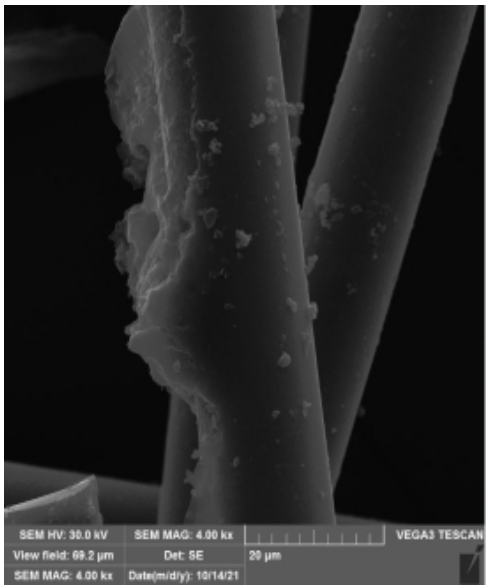


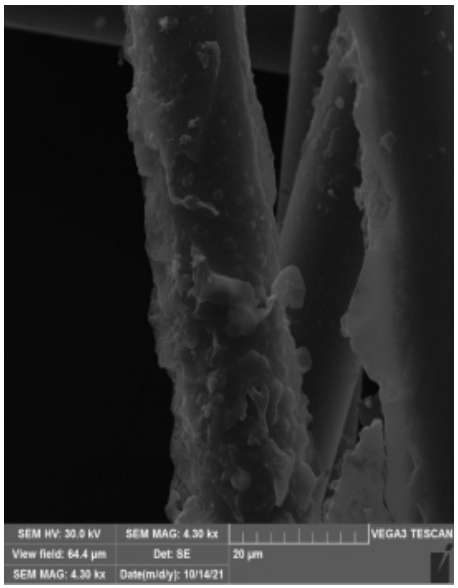


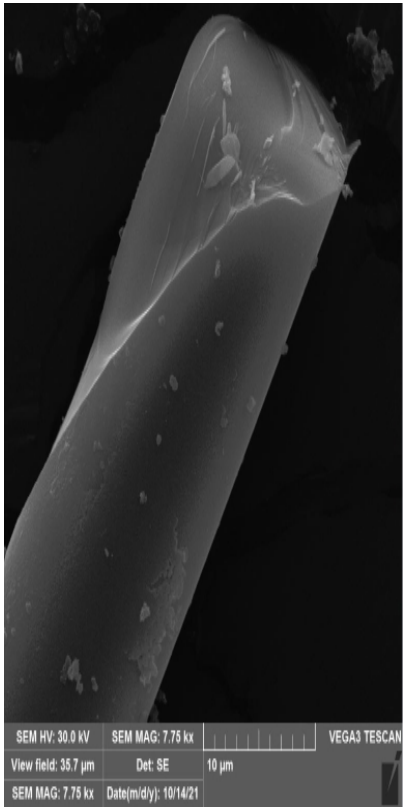


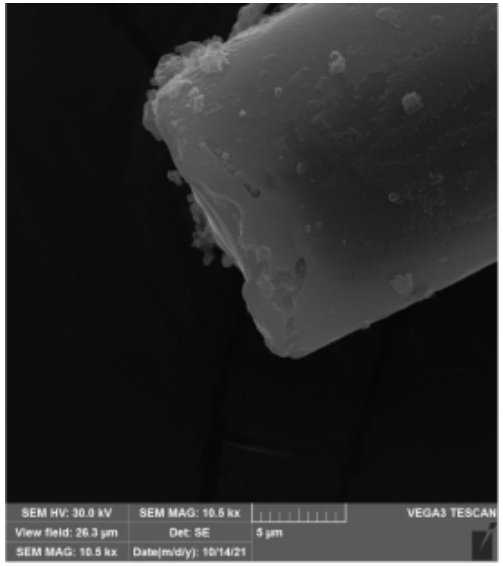
SEM on Glass Fibers – DI H2O

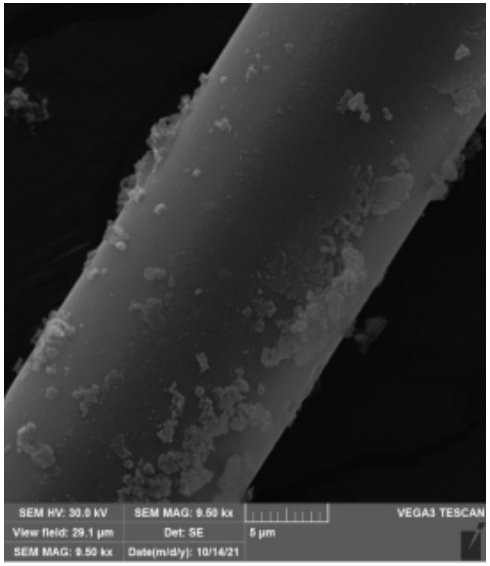


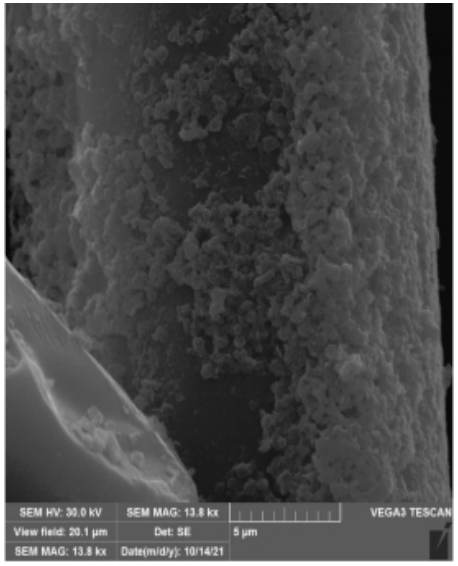




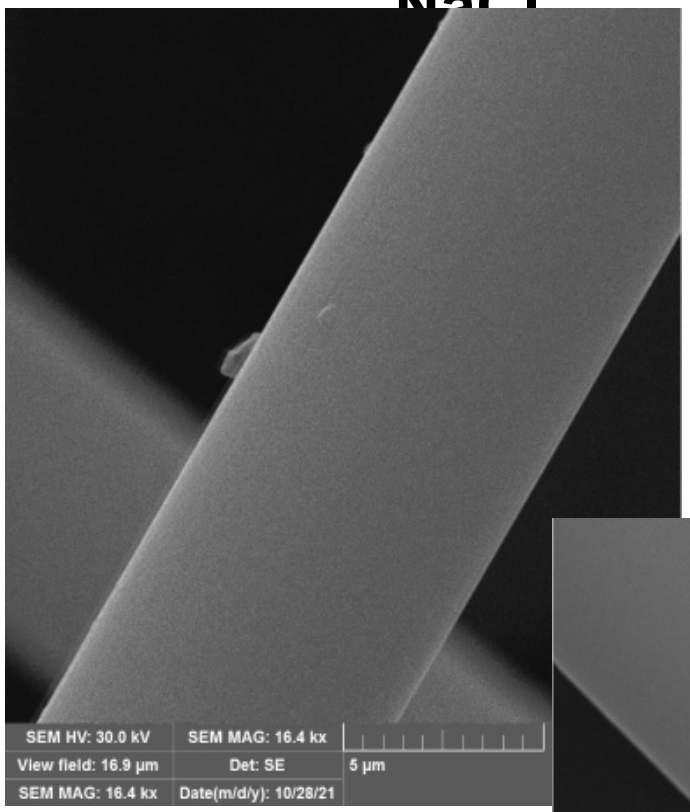


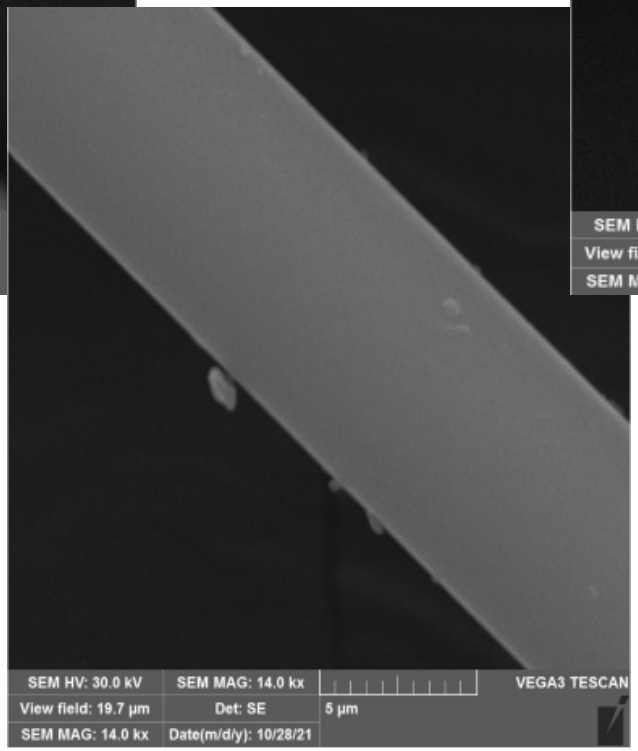


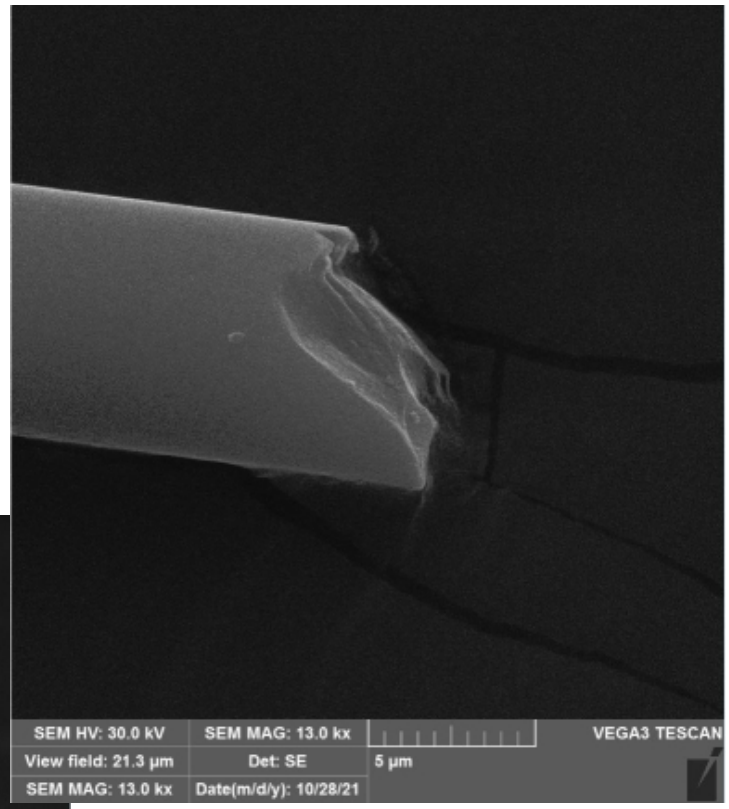




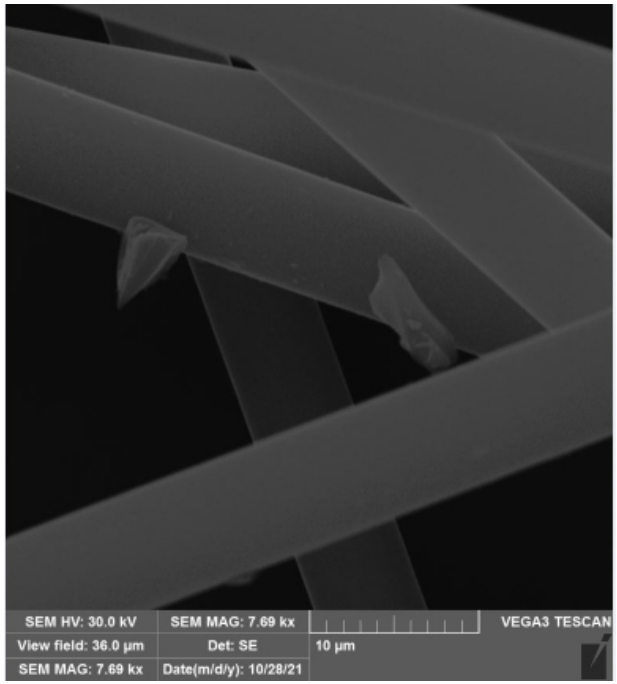
SEM on Carbon Fibers – 1M NaCl

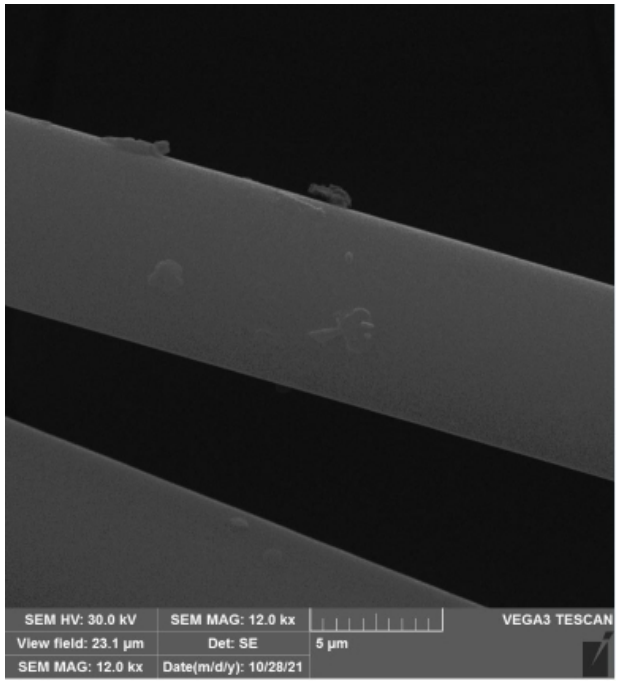


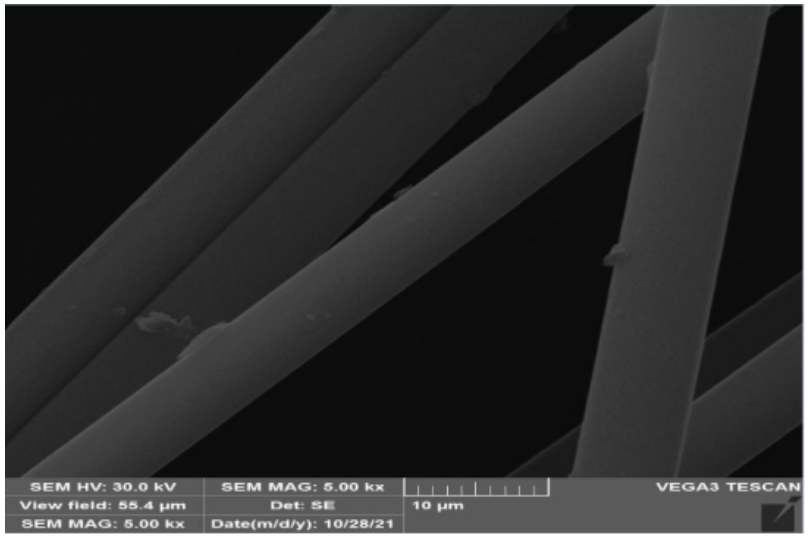


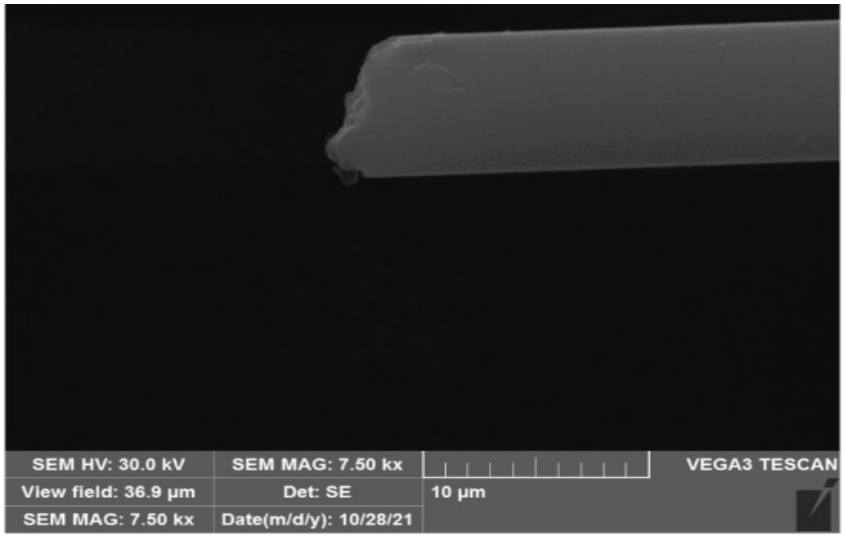


SEM on Carbon Fibers – DI H2O



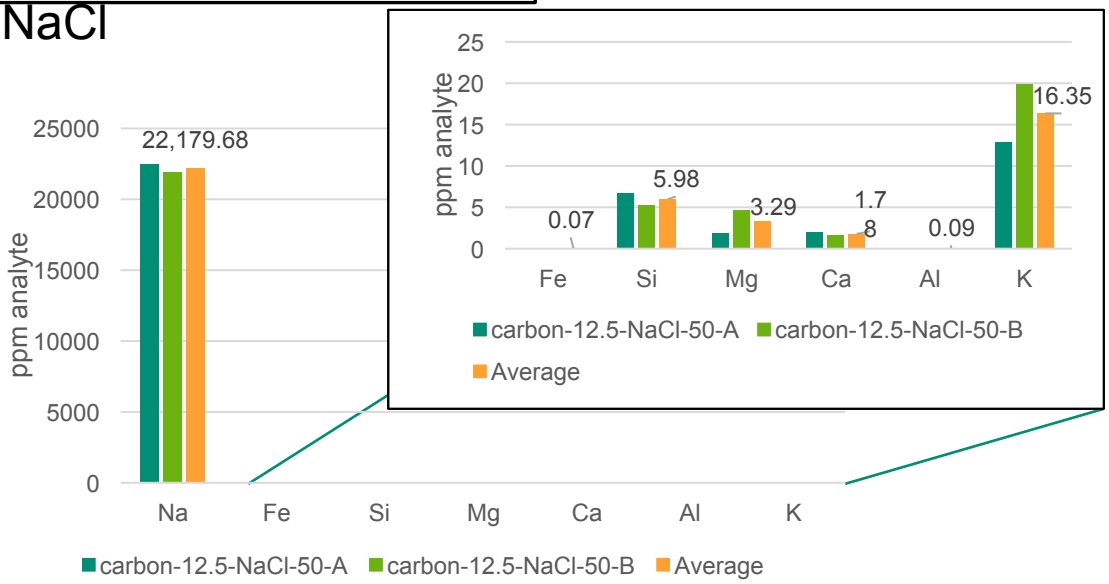






Solubility Experiments – ICP-OES

Carbon Fibers – 1M NaCl



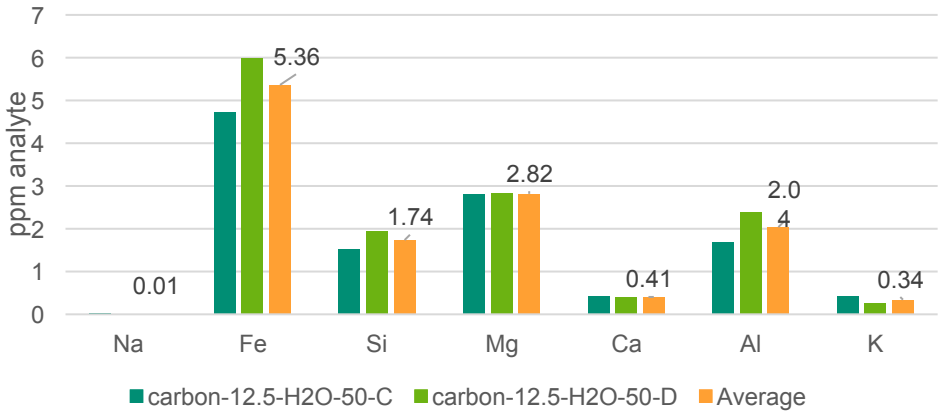
pH Analysis before & after hydrothermal treatment

Sample Name	initial pH	final pH
carbon fiber-12.5 mm-NaCl-50-A	6.12	4.07
carbon fiber-12.5 mm-NaCl-50-B	5.85	3.93
carbon fiber-12.5 mm-H2O-50-C		.35
carbon fib D		4.2

pH reaction solutions	
Solution	initial pH
1M NaCl	6.9
DI H2O	5.67

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

Carbon Fibers – DI H2O



Ongoing Work

- Geochemical modeling of solute chemistry (EQ3/6)

- XRF analyses on starting material and reaction products
- **Experimental design of flow-through reaction experiments on bentonite-fiber mixtures**

    - Materials/Vendors
    - ISCO pump/jacketed pressure vessel
    - PSDP – pressure testing
    - Ambient temperature and 150°C
    - Take aliquots of outlet solution for solution chemistry analysis

Appendix

Carbon Fiber XRD Search/Match Spectra