

Supplementary Information for Automated electron microscopy sample preparation system

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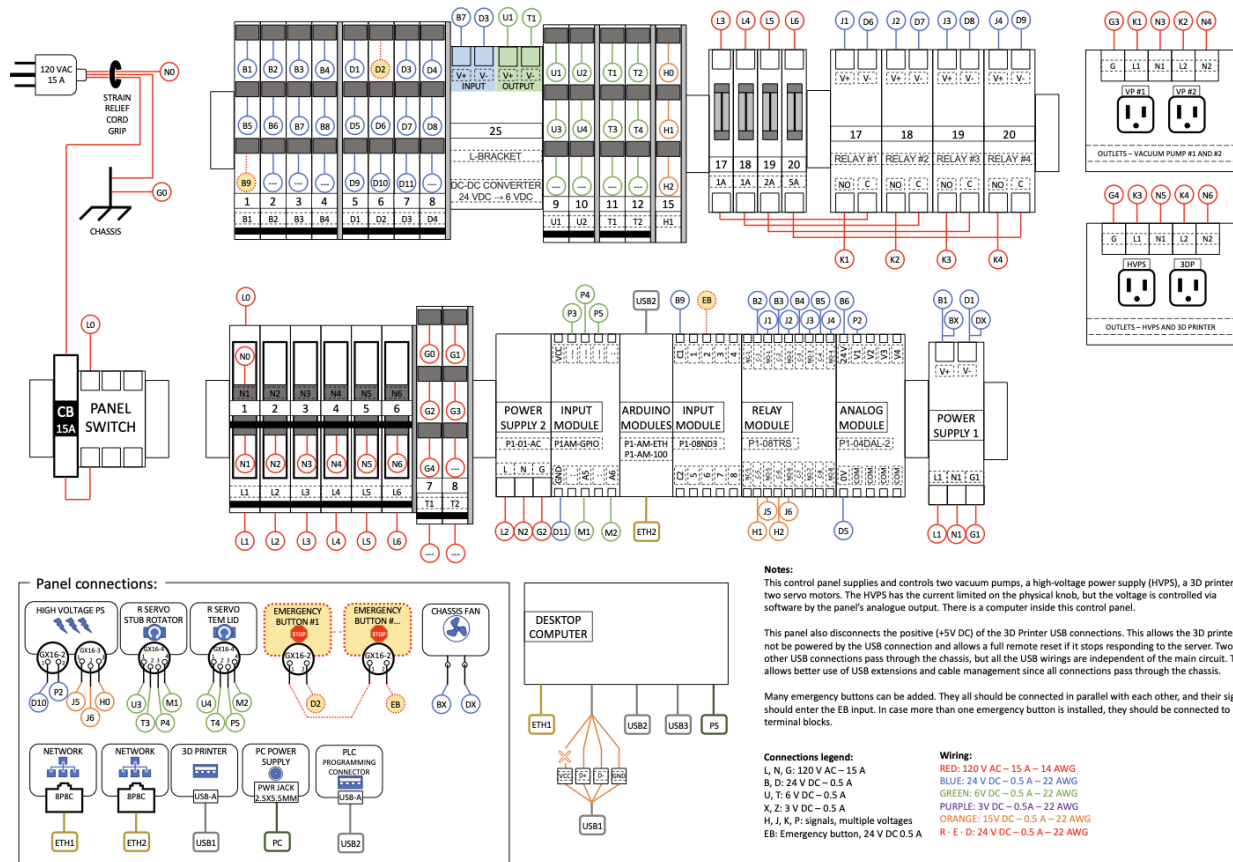
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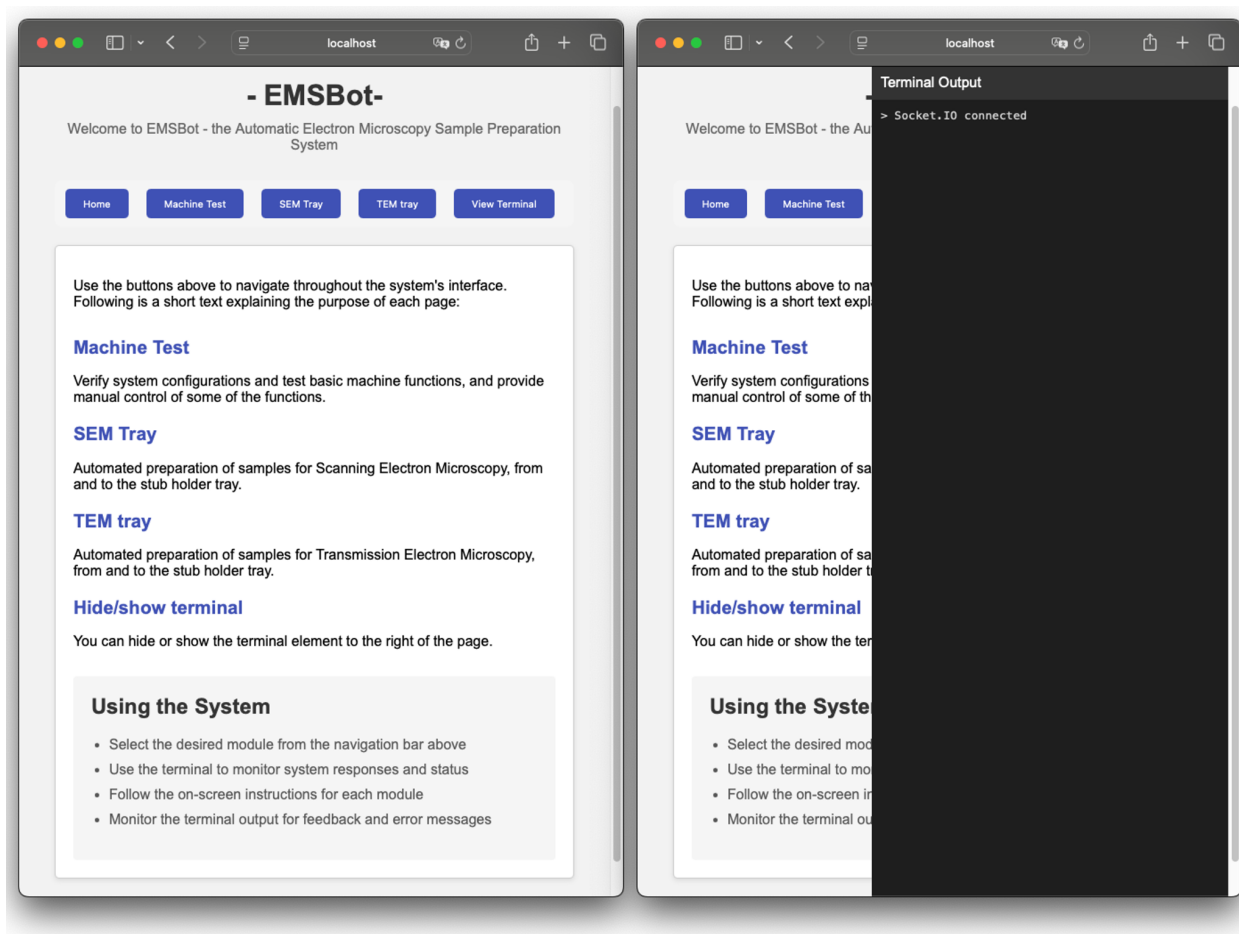


Supplementary Figure S1: Control panel chassis for the EMSBot.

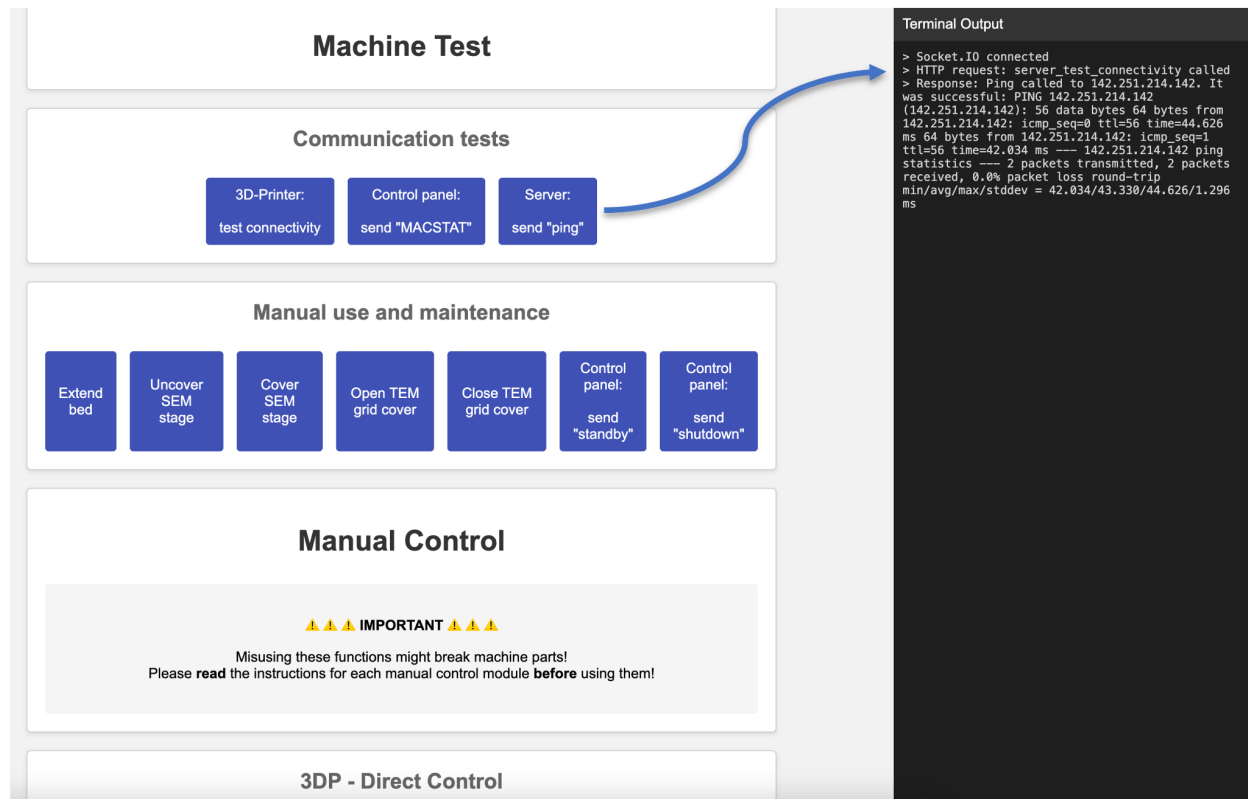


EMSBOT CONTROL PANEL - DISTRIBUTION AND INTERCONNECTION DIAGRAM

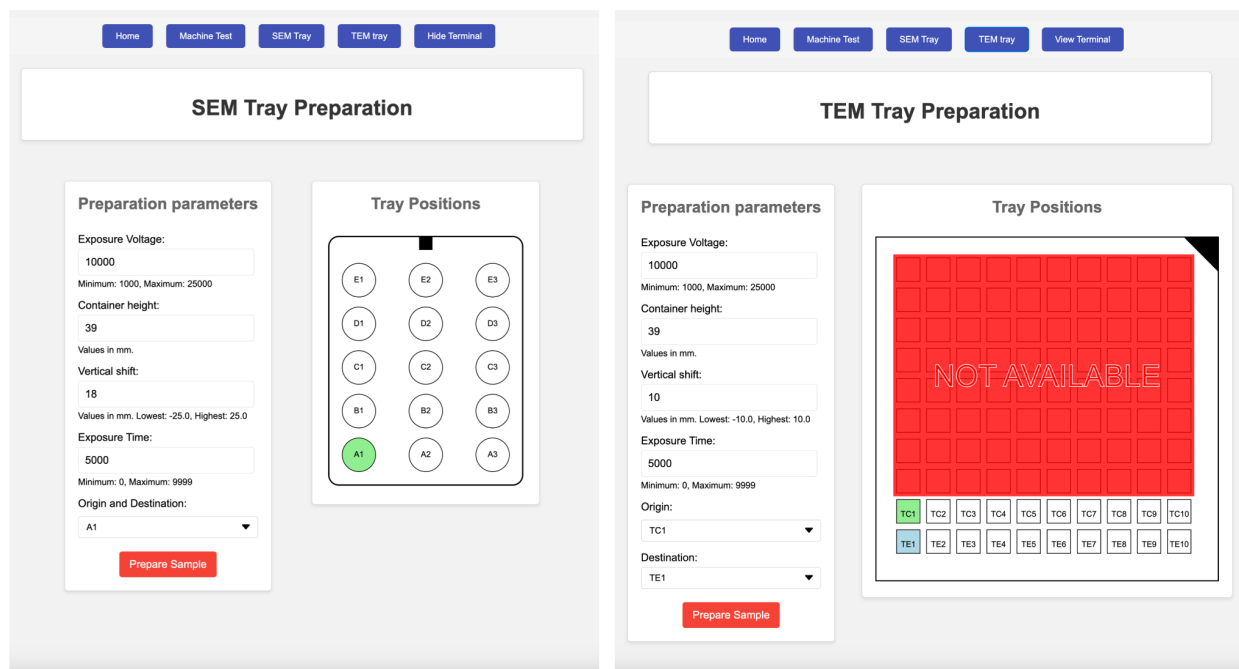
Supplementary Figure S2: Control panel diagram for the EMSBot showing electrical circuit diagrams.



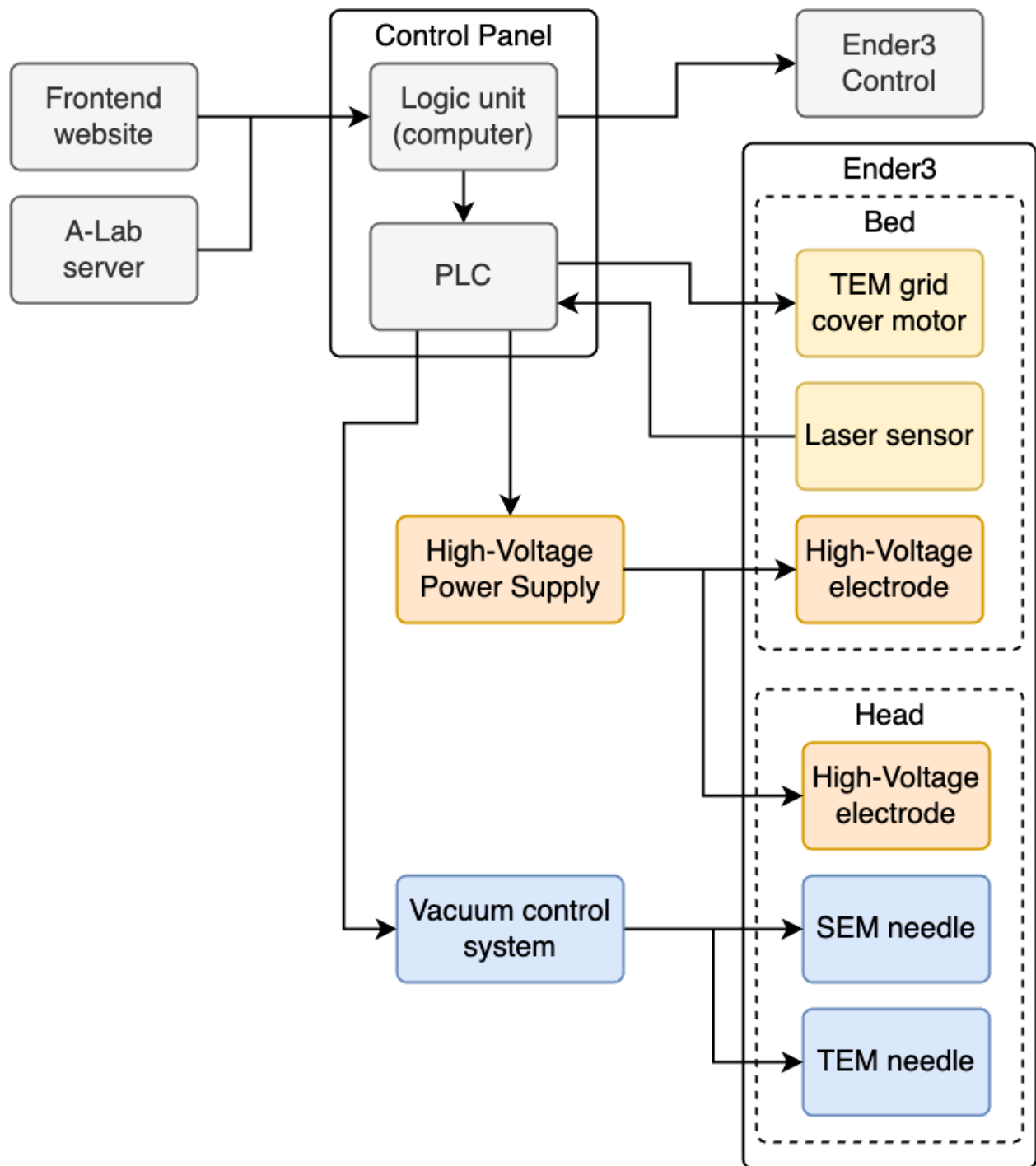
Supplementary Figure S3: EMSBot webpage based GUI interface.



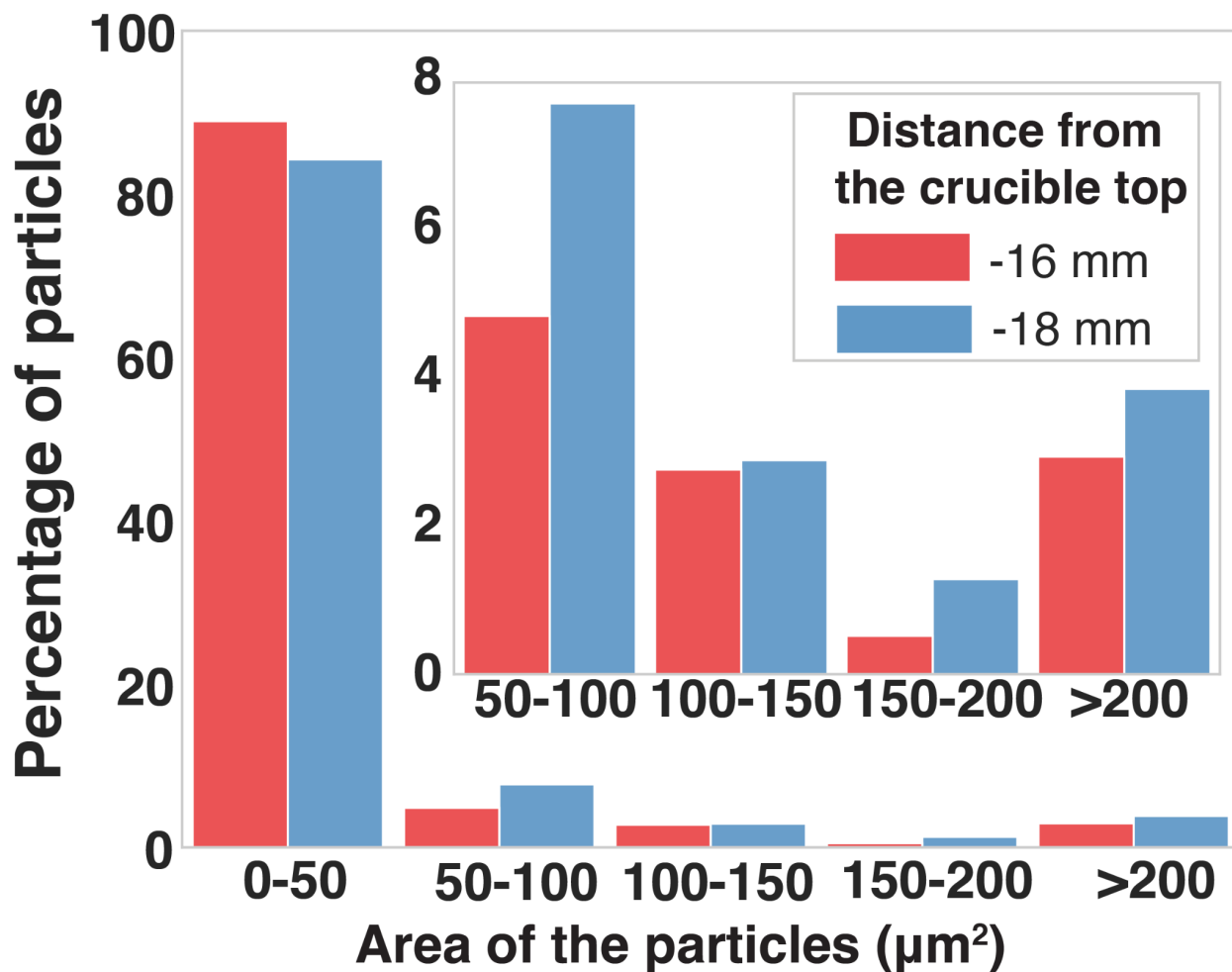
Supplementary Figure S4: Interface and controls during machine test. Terminal interface with the control messages and feedback from EMSBot.



Supplementary Figure S5: Sample preparation screen for EMSBot for (left) SEM and (right) TEM.

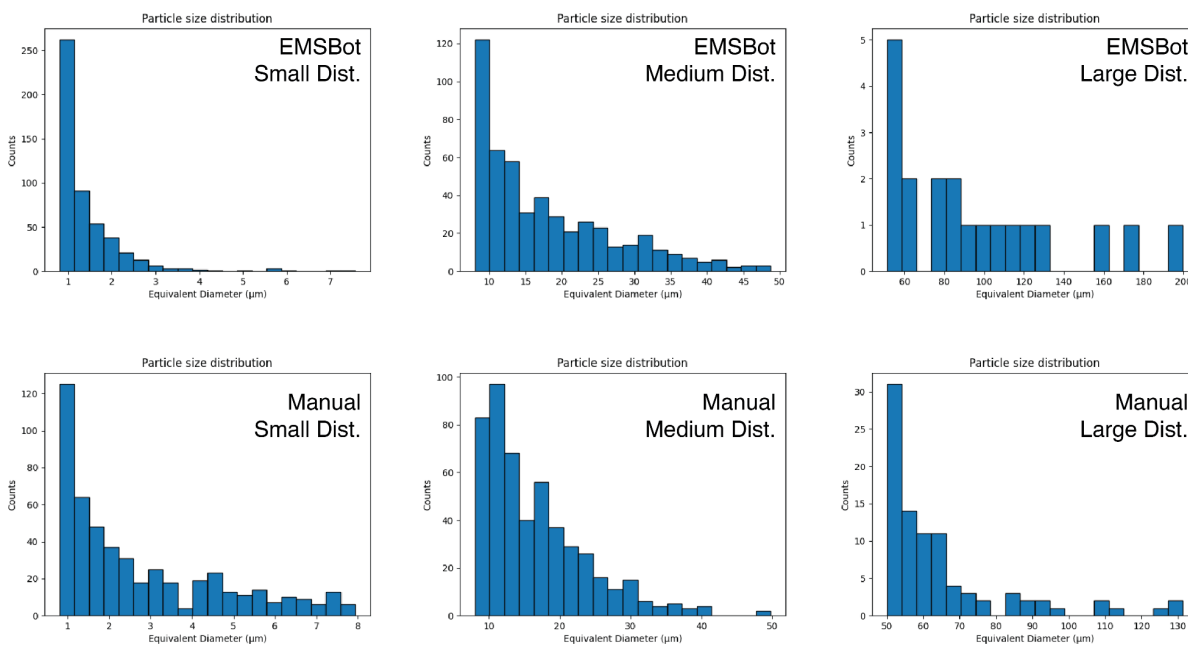


Supplementary Figure S6: Control flow diagram for the electron microscopy sample preparation using EMSBot.

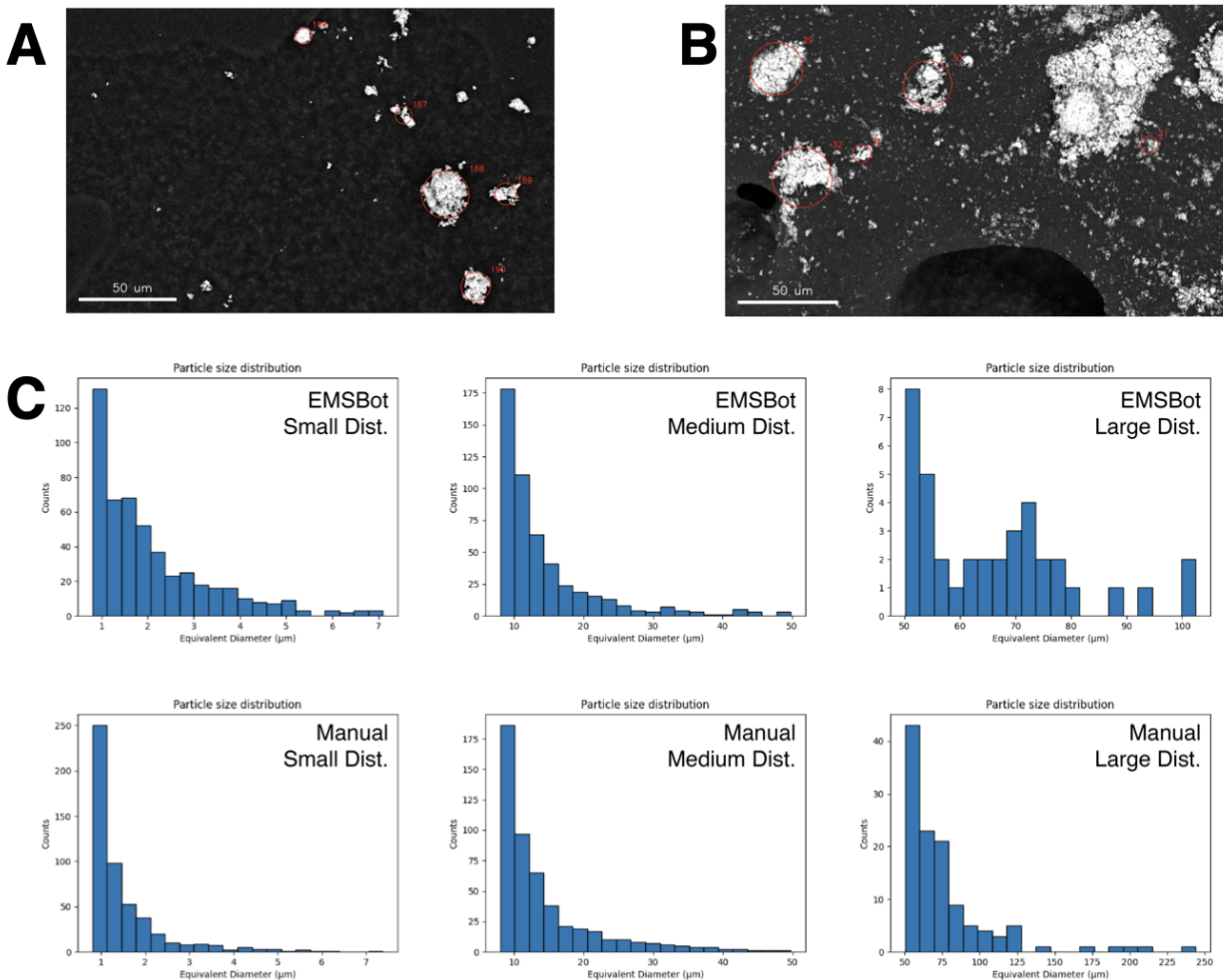


Supplementary Figure S7: The distribution of particle size when the SEM grid is at distance of -16 mm and -18 mm. The total number of particles analyzed for 580 and 311 particles were analyzed for the -16 mm and -18 mm from the top of the crucible respectively. (Inset) Magnified histogram of the distribution of the particles > 25 μm.

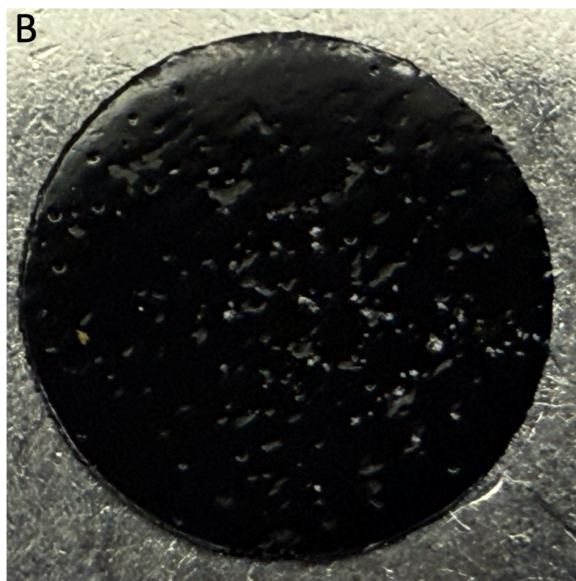
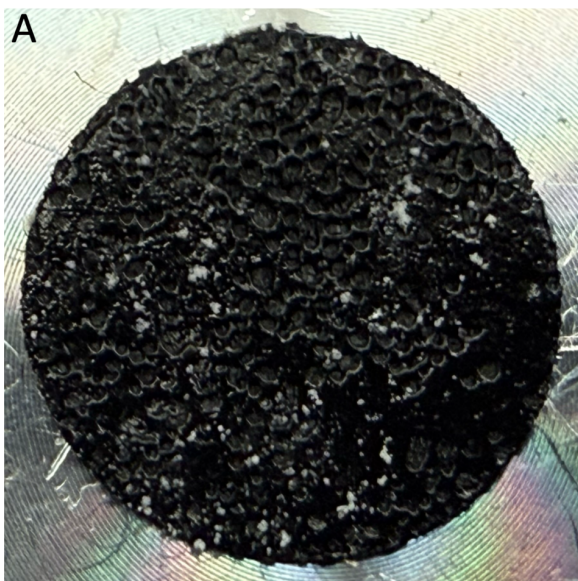
Particle Size Distributions - Ball Milled Sample



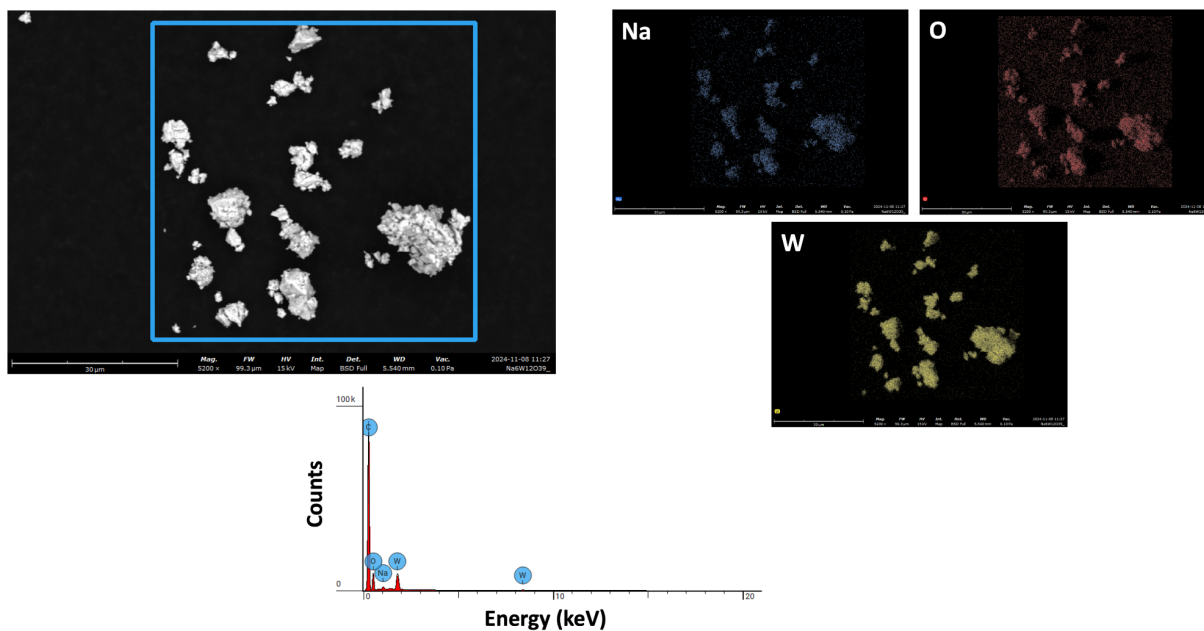
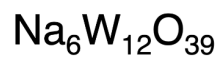
Supplementary Figure S8: Statistical analysis of particle sizes for ball-milled precursor samples of $\text{Na}_4\text{P}_2\text{O}_7$ and SnO_2 , prepared using both the EMSBot and manual methods.



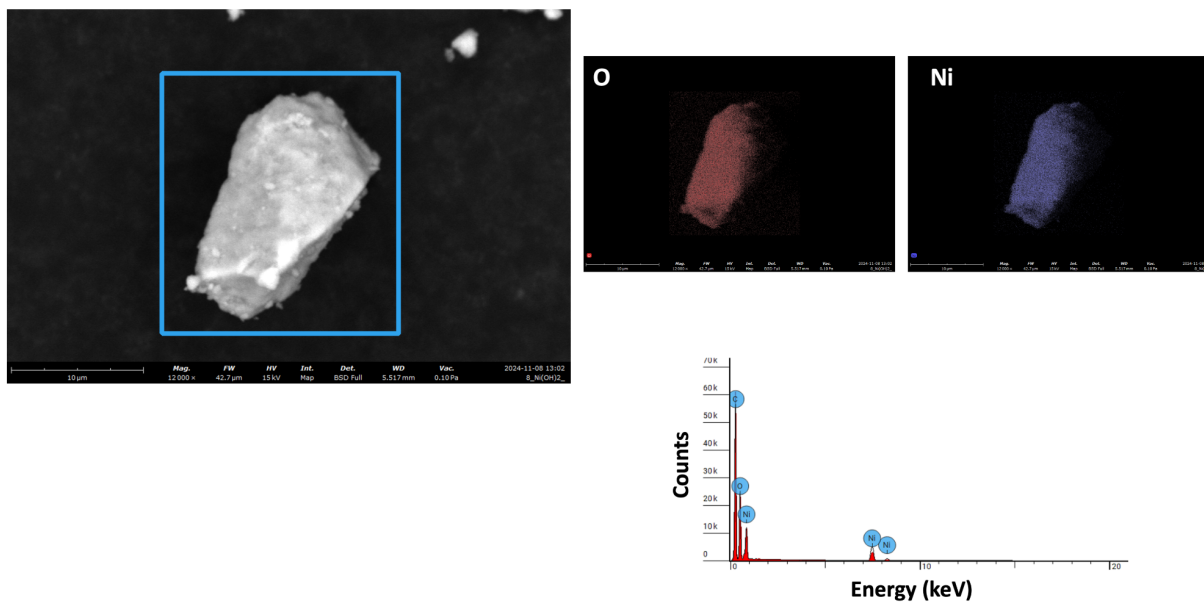
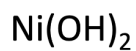
Supplementary Figure S9: Comparison of SEM images of samples prepared using EMSBot (A) and manual methods (B), based on wet spin mixing of $\text{Na}_4\text{P}_2\text{O}_7$ and SnO_2 precursors. The example images are shown for medium sized particles (8-50 μm diameter). Images on the left are the SEM with overlaid red circles demonstrating where the automated SEM program identified a single particle, as well as the particle's identification number. Images are chosen to be as representative as possible. (C) Statistical analysis of particle sizes, for SEM samples prepared using the EMSBot and manual methods.



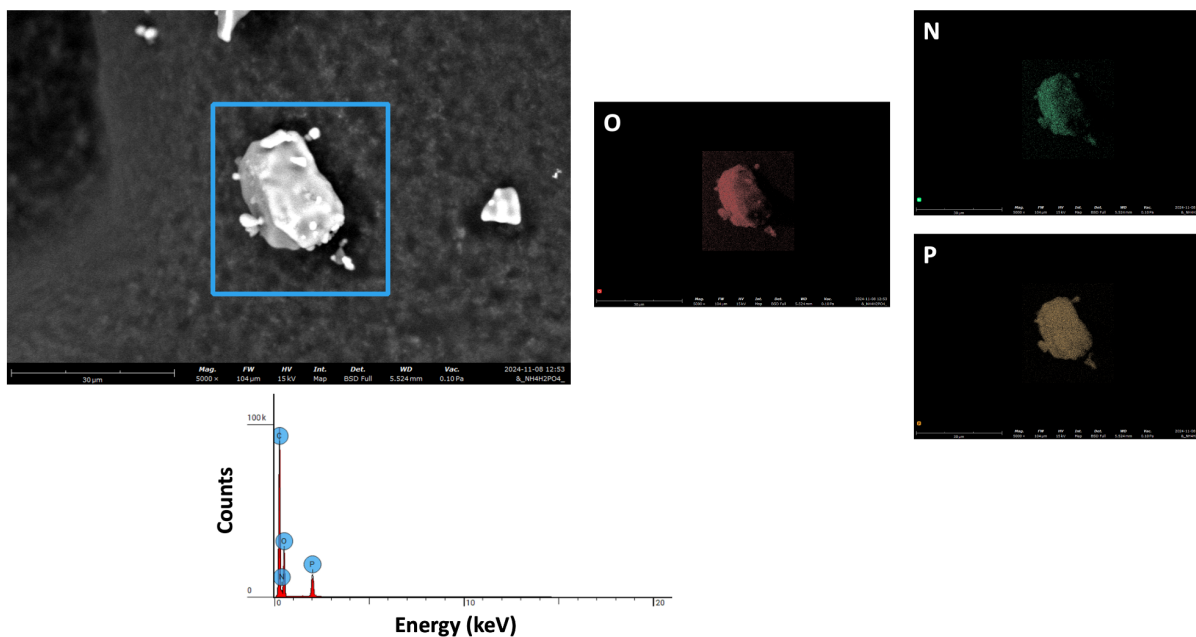
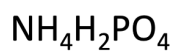
Supplementary Figure S10: Comparison of SEM sample prepared (A) manually vs (B) using EMSBot.



Supplementary Figure S11: SEM micrograph for the $\text{Na}_6\text{W}_{12}\text{O}_{39}$ sample prepared using EMSBot and the respective Na, O, and W EDS compositional maps along with the total EDS spectrum.

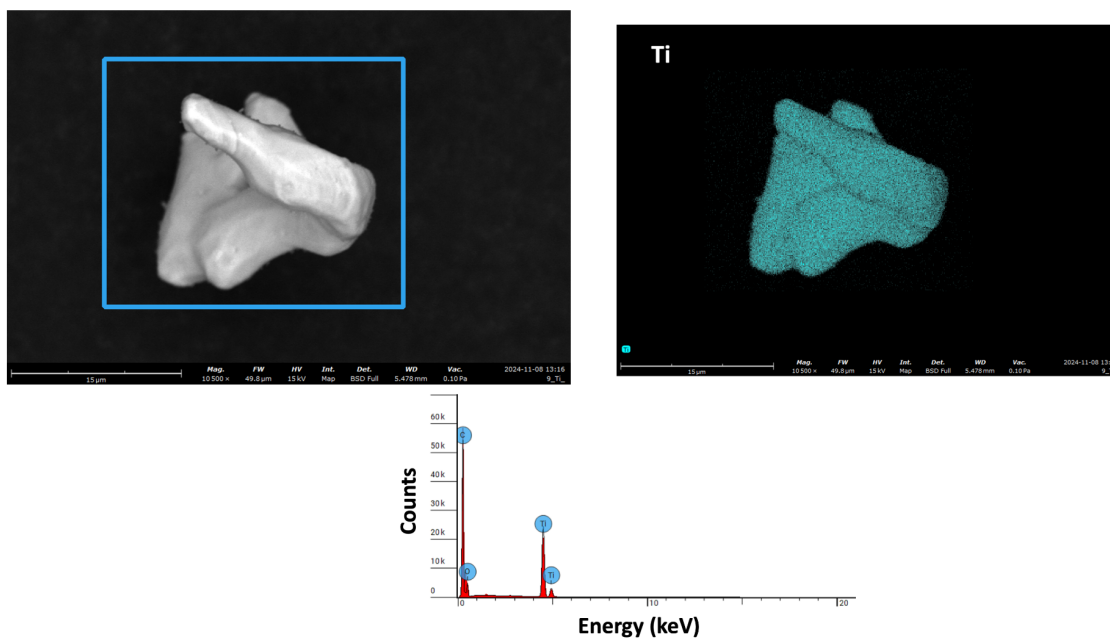


Supplementary Figure S12: SEM micrograph for the $\text{Ni}(\text{OH})_2$ sample prepared using EMSBot and the respective Ni and O EDS compositional maps along with the total EDS spectrum.



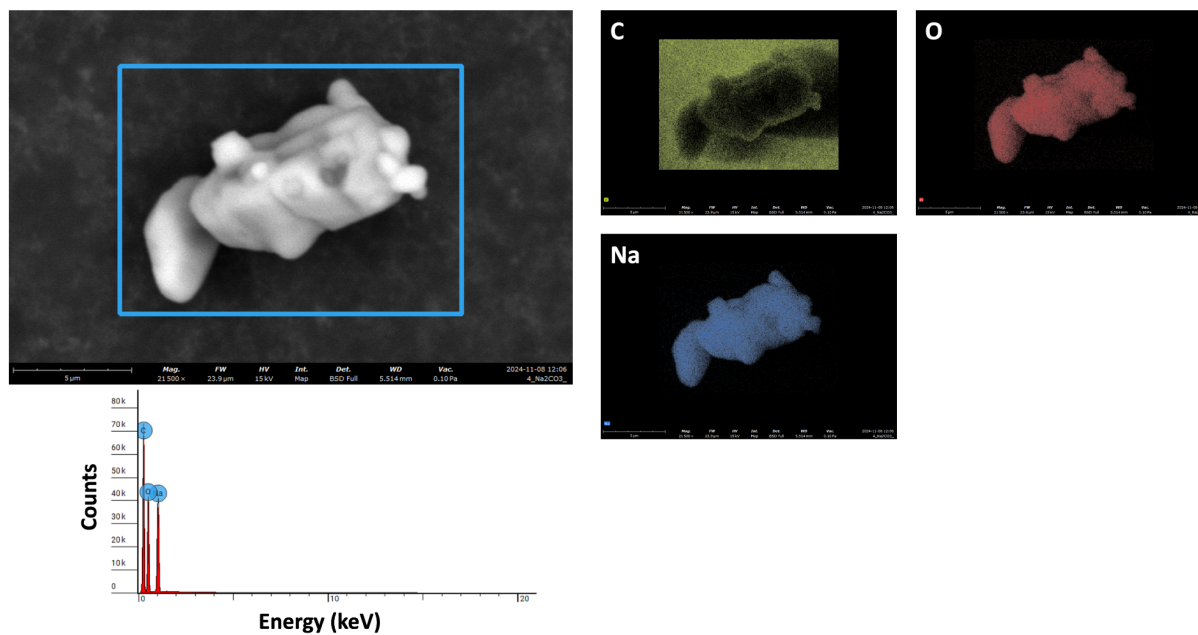
Supplementary Figure S13: SEM micrograph for the $\text{NH}_4\text{H}_2\text{PO}_4$ sample prepared using EMSBot and the respective N, P, and O EDS compositional maps along with the total EDS spectrum.

Ti



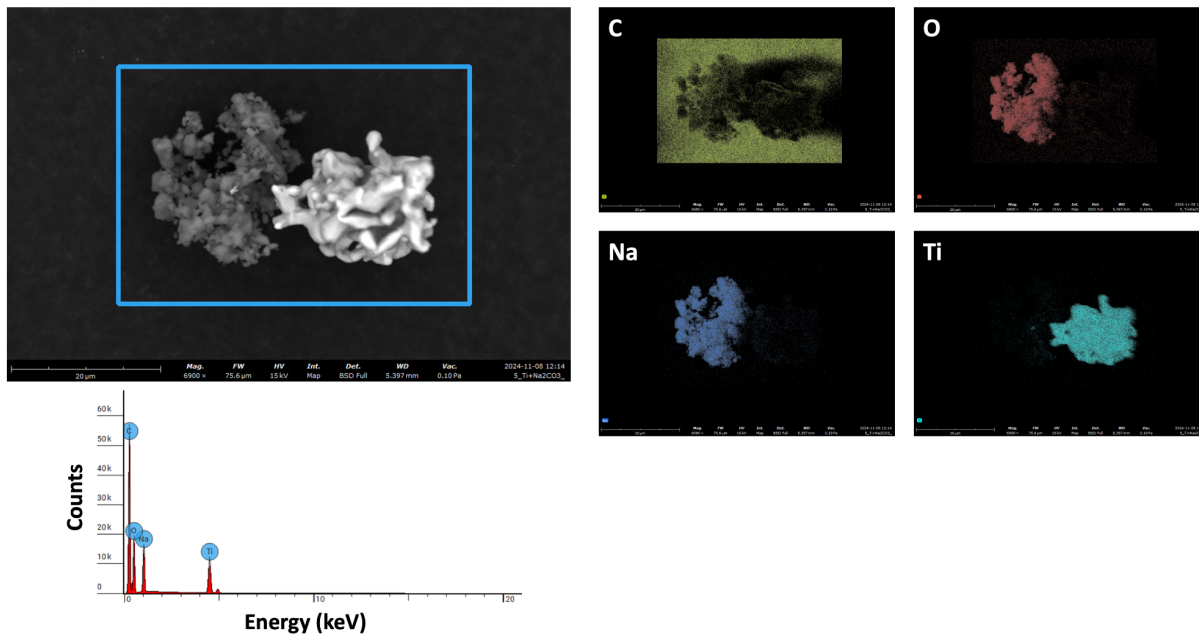
Supplementary Figure S14: SEM micrograph for the Ti sample prepared using EMSBot and the respective Ti EDS compositional maps along with the total EDS spectrum.

Na_2CO_3



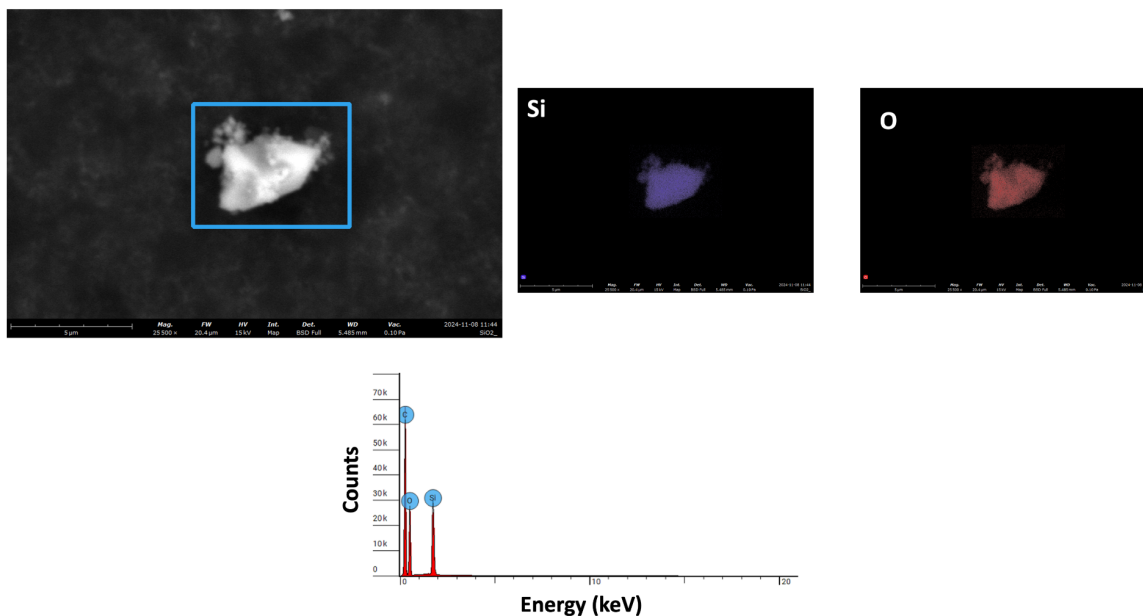
Supplementary Figure S15: SEM micrograph for the Na_2CO_3 sample prepared using EMSBot and the respective C, Na, and O EDS compositional maps along with the total EDS spectrum.

Ti+ Na₂CO₃



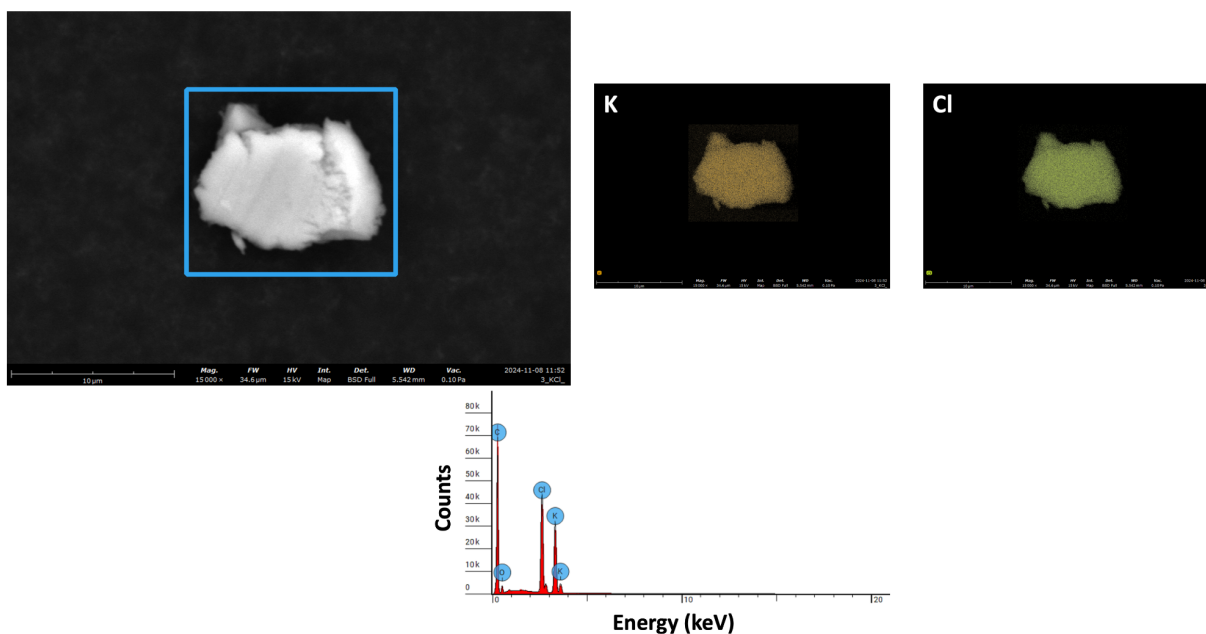
Supplementary Figure S16: SEM micrograph for the mixture of Na₂CO₃ and Ti samples prepared using EMSBot and the respective C, O, Na, and Ti EDS compositional maps along with the total EDS spectrum.

SiO₂



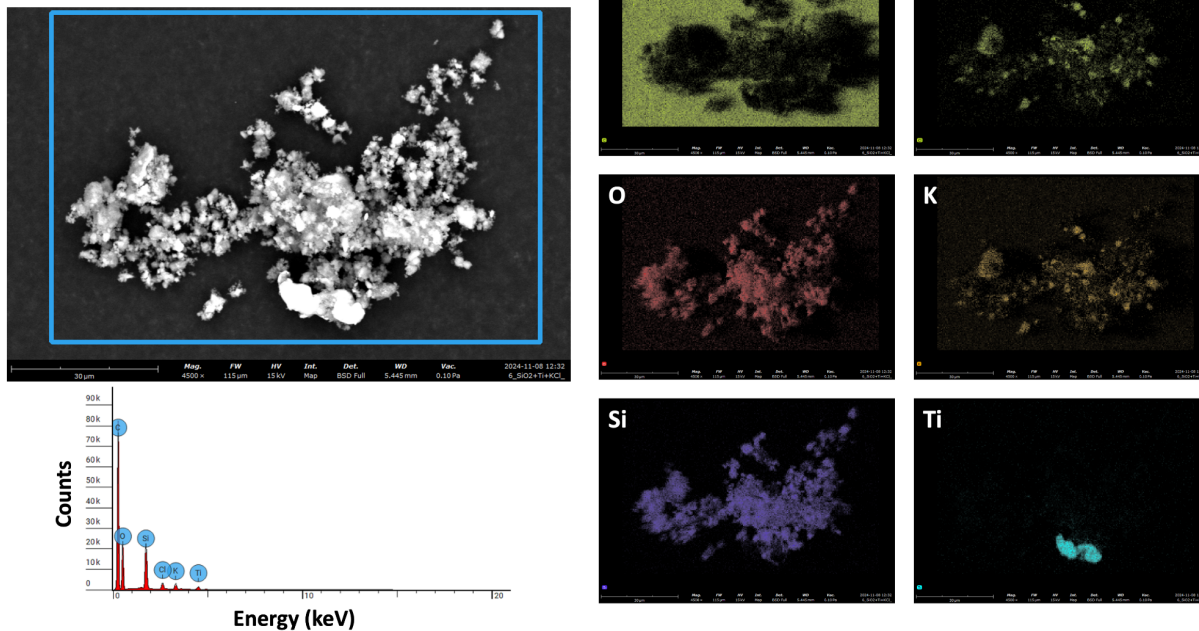
Supplementary Figure S17: SEM micrograph for the SiO₂ sample prepared using EMSBot and the respective Si and O EDS compositional maps along with the total EDS spectrum.

KCl



Supplementary Figure S18: SEM micrograph for the KCl sample prepared using EMSBot and the respective K and Cl EDS compositional maps along with the total EDS spectrum.

SiO₂+Ti+KCl



Supplementary Figure S19: SEM micrograph for the mixture of SiO₂, Ti, and KCl samples prepared using EMSBot and the respective C, Cl, O, K, Si, and Ti EDS compositional maps along with the total EDS spectrum.