



Supplementary Figure 3. (a) Mn oxidation state, (b) fraction Mn(II), (c) fraction Mn(III), and (d) fraction Mn(IV) of $5 \times 5 \mu\text{m}^2$ spots obtained from chemmap compared to those from μ -XANES. Colors represent the size and sampling location of the particles where the measurement was taken: SSF particles from near-field (red) and far-field (green) plumes, LSF particles from near-field (black) and far-field (blue) plumes. The dotted lines indicate the 1:1 line.