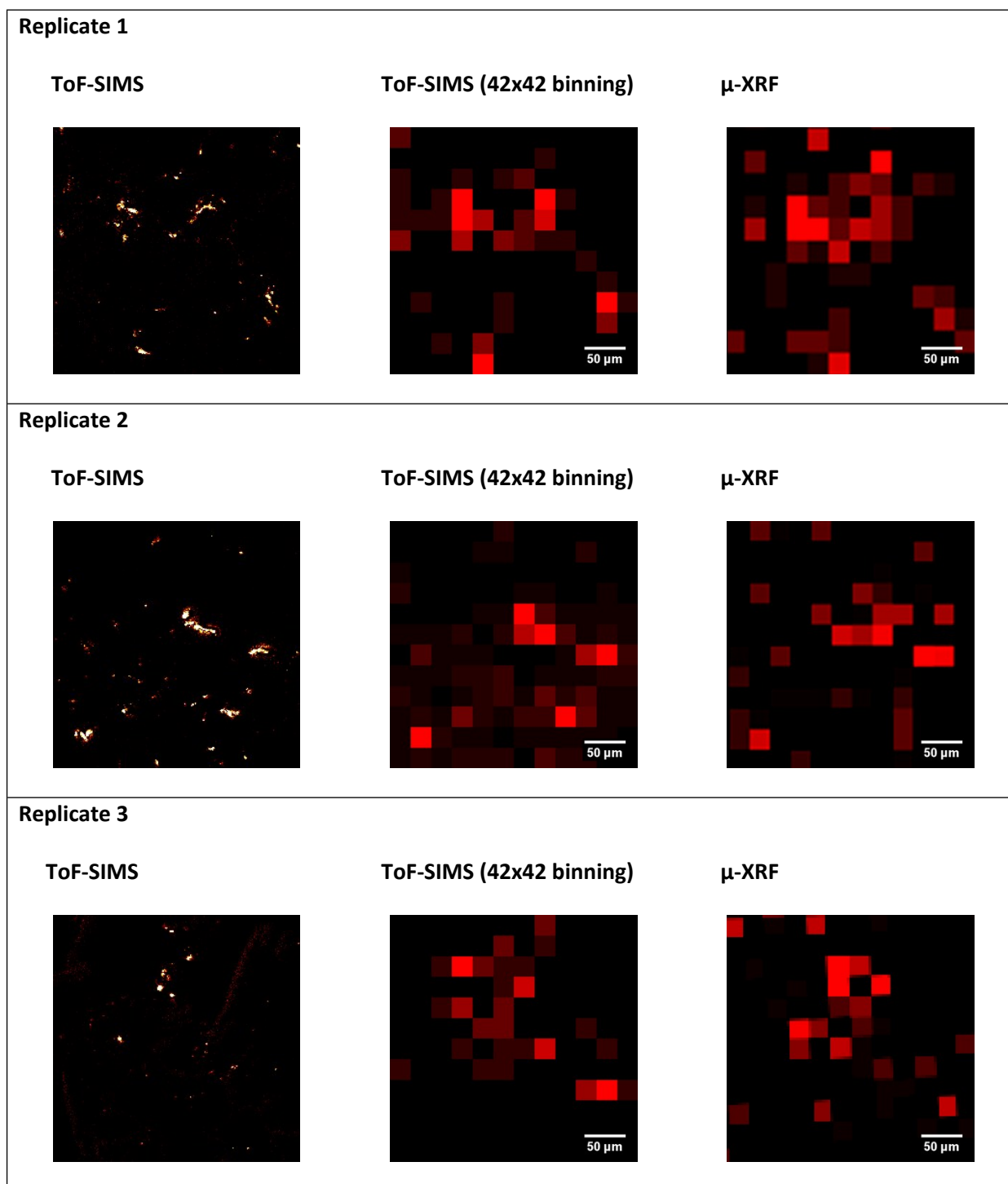


## 1 Supporting Information

### 2 Figure 1: Replicate analyses



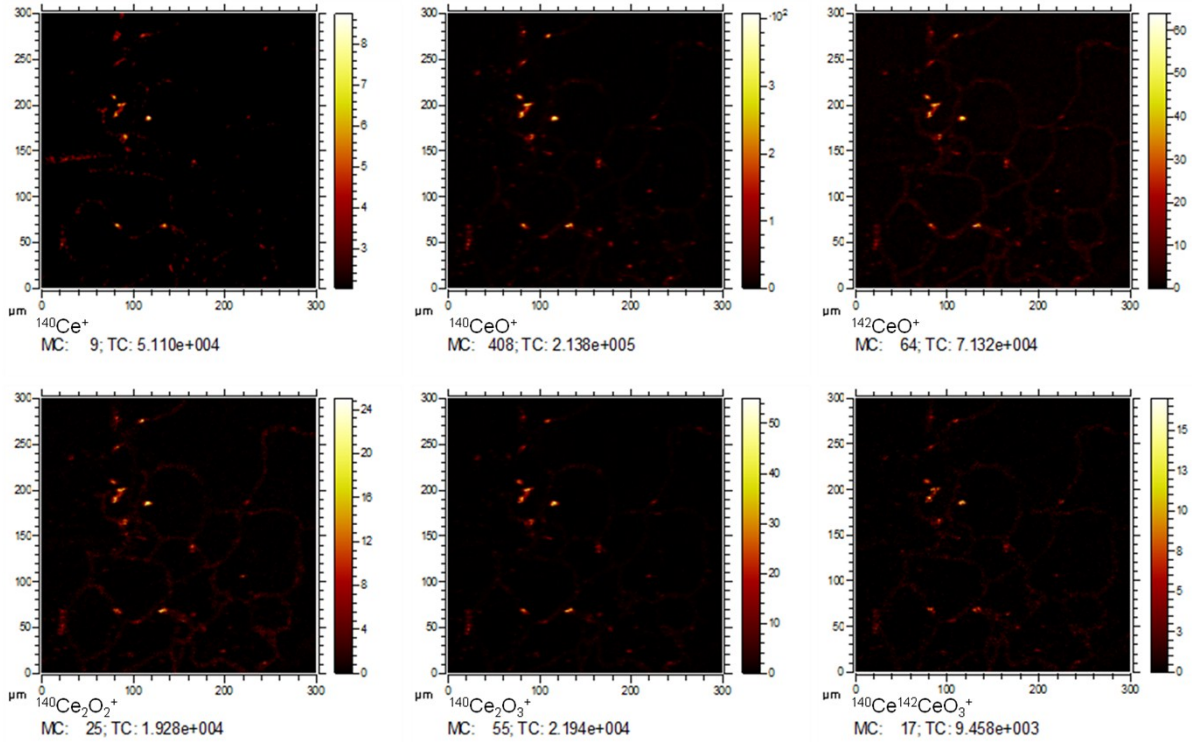
3

4 Figure 1: The three rows show replicate analyses of Ce-rich areas. The first column shows the original Ce ToF-SIMS signal  
5 distributions (at pixel sizes of about 670x670 nm<sup>2</sup>), whereas the central column presents the same signal distribution  
6 after formation of superpixels from 42x42 individual pixels (42x binning) to reduce the ToF-SIMS lateral resolution to the

7 same value as the  $\mu$ -XRF (pixel size  $25 \times 25 \mu\text{m}^2$ ). The third column shows the  $\mu$ -XRF signal distribution. Similar signal  
8 distributions are obtained by both techniques

9

10 **Figure 2: Colocalized Ce distributions**



11

12 **Figure 2: Colocalized signal distributions of  $\text{Ce}_x\text{O}_y^+$  isotopes and clusters prove the correct the assignment of Ce to the**  
13 **ToF-SIMS signals. Some slightly interfering influences can be observed (for  $^{140}\text{Ce}^+$  and  $^{140}\text{Ce}_2\text{O}_2^+$ ). However, the**  
14 **distribution of the intense areas matches throughout all the displayed secondary ion species.**

15