	Nanolite and Matrix A							Nanolite and Matrix B							
Direction from nanolite	**Left**			**At**	**Right**			**Left**				**Right**			
Distance from nanolite (nm)	**75**	**50**	**25**	**0**	**25**	**50**	**75**	**175**	**125**	**75**	**25**	**25**	**75**	**125**	**175**
2^{nd} RDF peak location	2.99	2.99	2.91	2.85	2.91	2.95	3.01	2.90	2.84	2.65	2.63	2.72	2.84	2.90	2.91
3^{rd} RDF peak location	4.14	4.14	4.12	4.07	4.30	4.16	4.23	4.03	3.97	3.77	3.68	3.79	3.91	4.03	4.04

TABLE I. Changes in RDF peak positions as a function of distance from longitudinal axis of Fe-oxide Nanolite A. Error is calculated based on the upper and lower values of the covariance values calculated from the scipy curve fitting function for the background fit. Systematic error from background fitting the radial intensity profile has the greatest potential effect on peak position calculations; however, the calculated errors are mostly one to two orders of magnitude smaller than the precision to which we are reporting the RDF peak locations. For RDF analysis of Nanolite and Matrix A, the mean difference in peak positions, maximum difference in peak positions, and the standard deviation in peak positions between the upper ($+\sigma$) and lower ($-\sigma$) background fits for the second peak are $\bar{x} = 0.005$ Å, max = 0.008 Å, and $\sigma = 0.002$ Å, respectfully. For the third peak, these values are $\bar{x} = 0.013$ Å, max = 0.047 Å, and $\sigma = 0.018$ Å. For Nanolite and Matrix B, the values for the second peak are $\bar{x} = 0.007$ Å, max = 0.011 Å, and $\sigma = 0.002$ Å and for the third peak are $\bar{x} = 0.016$ Å, max = 0.049 Å, and $\sigma = 0.014$ Å. The accuracy is lower for the third peak compared to the second peak because of a more diffuse diffraction ring.

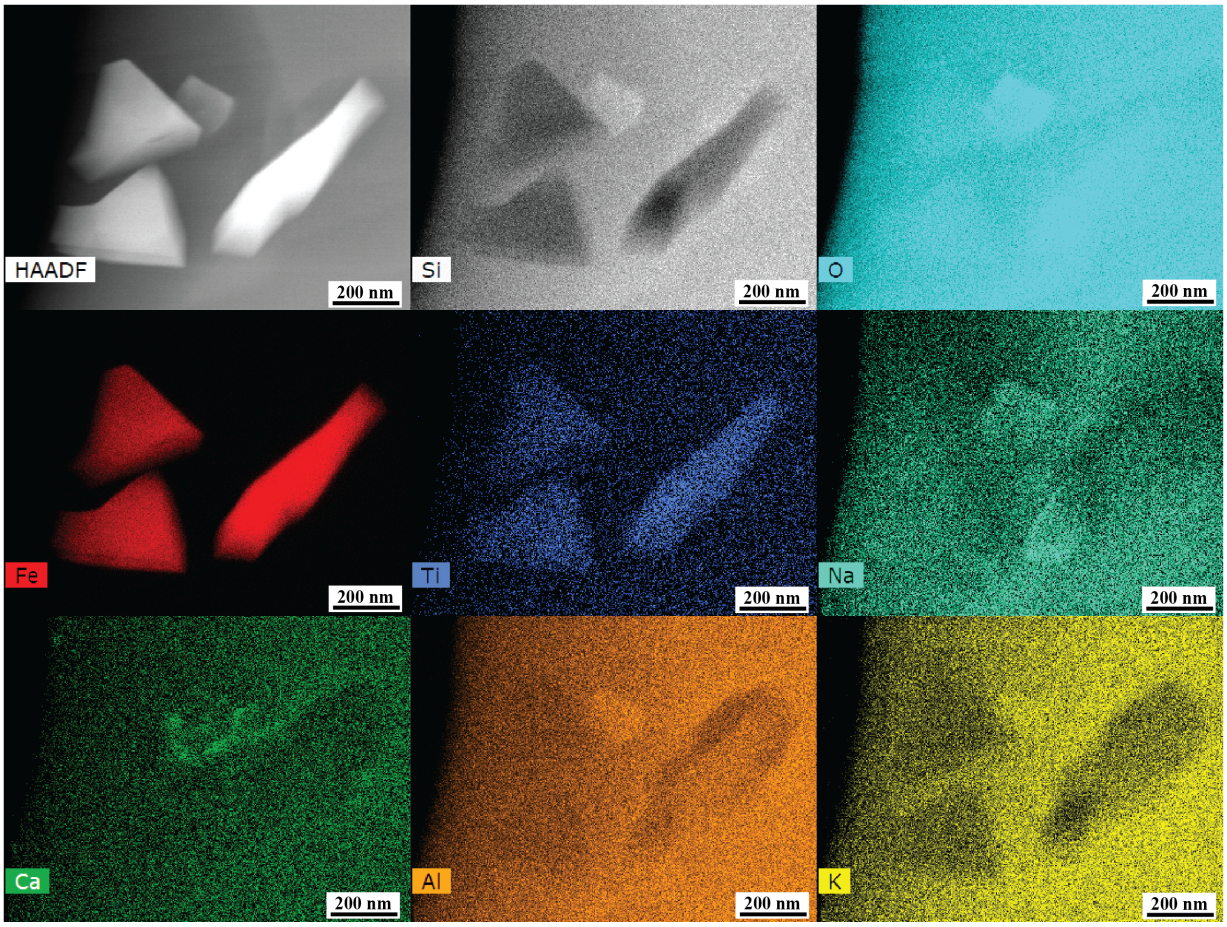

FIG. 1. Cluster of three Fe-oxide nanolites with Na, K, Al, and Ca depletion regions extending beyond the nanolite-matrix interface. The K exhibits the most apparent depletion. Al uniquely appears in higher concentration within the nanolites than in the matrix immediately adjacent to the nanolite. The depletion boundaries of Na and Ca are less defined than those of Al and K.

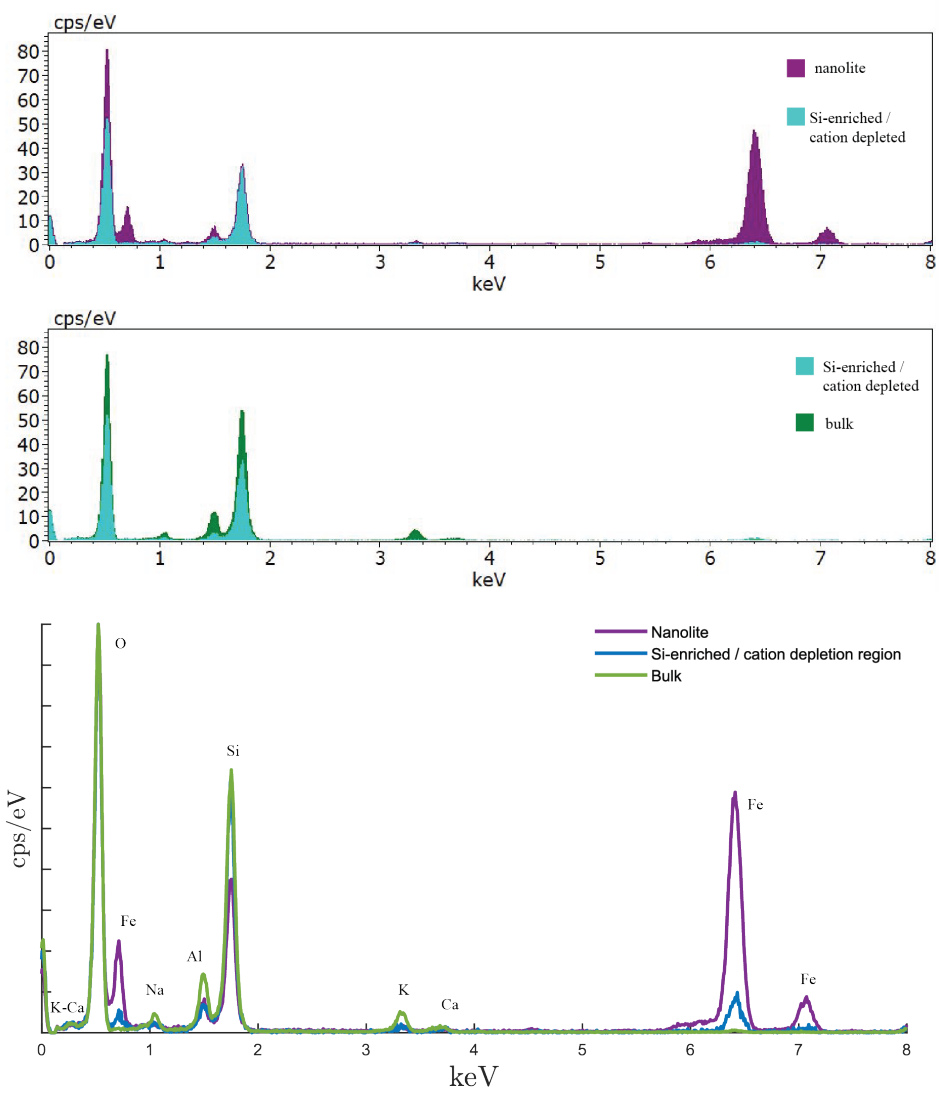

FIG. 2. Representative EDS spectra taken from Nanolite and Matrix B showing the relative change in elemental composition across the bulk, depletion regions, and Fe-oxide nanolites. The top two plots are directly from the Bruker Quantax EDS software and the third plot is a normalized plot of the regions shown in the plots above.

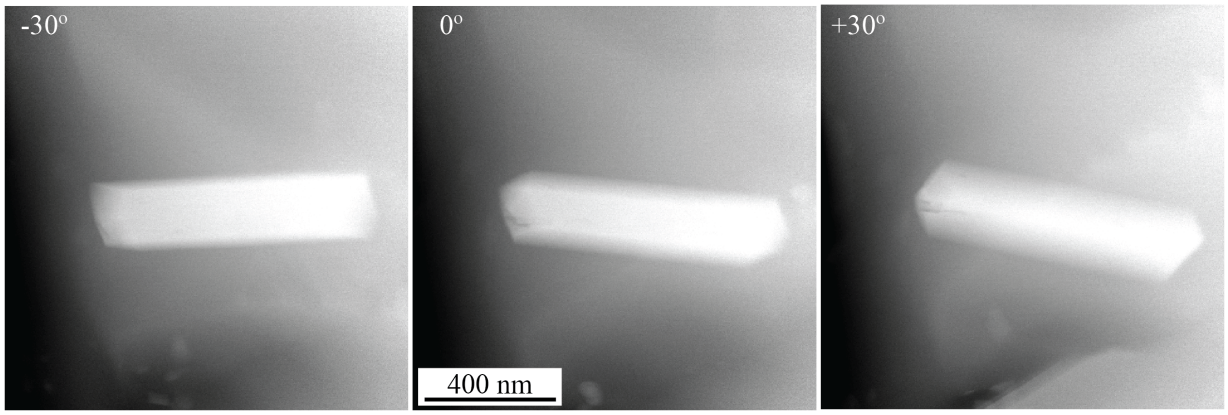

FIG. 3. Fe-oxide nanolite listed and imaged from three angles, showing that the rod geometry is unique from the plate geometry. The rod-like nanolites are not plate-like nanolites observed along an edge.

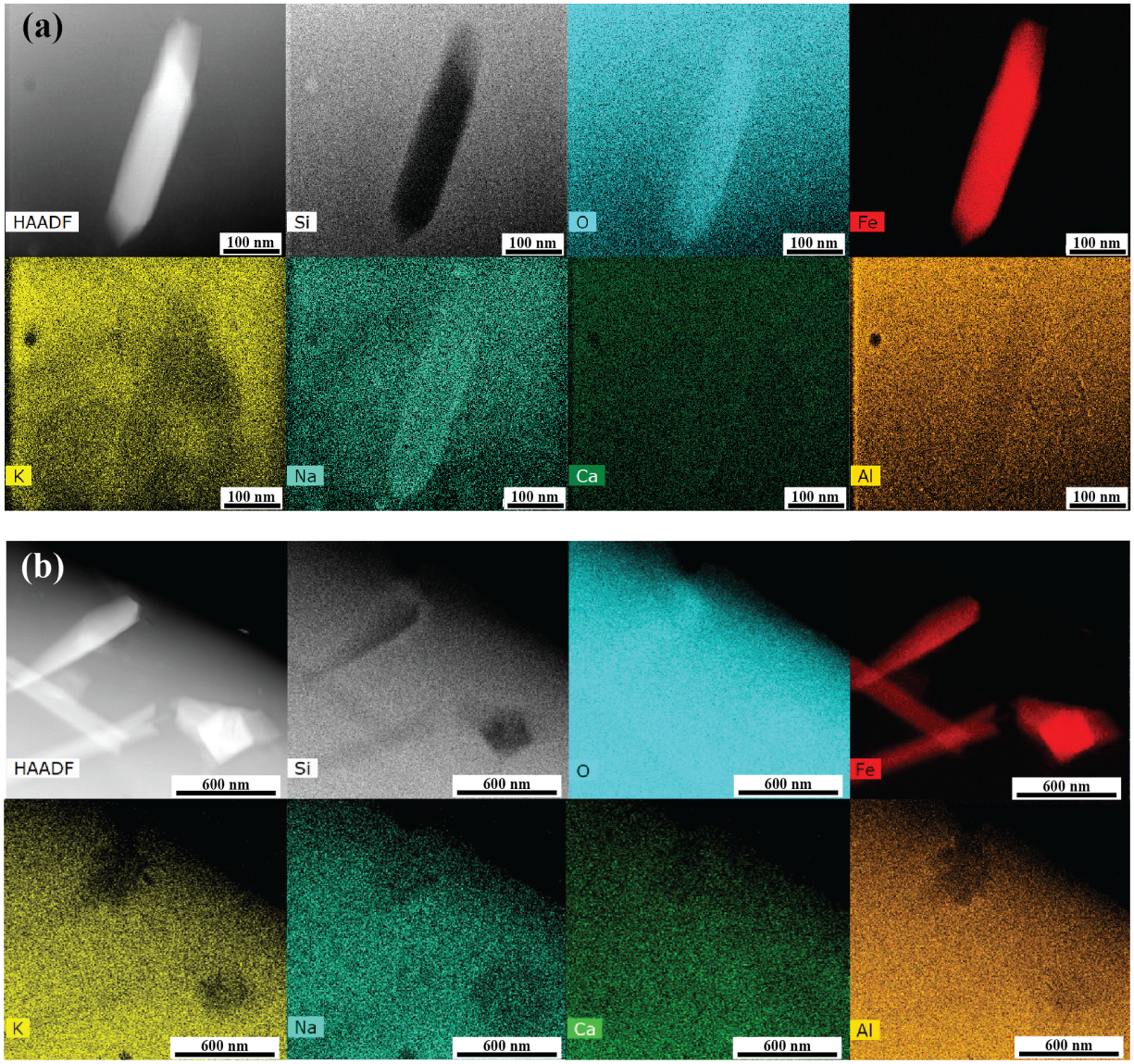

FIG. 4. EDS maps from the two Fe-oxide nanolites shown in Figure 3. The concentrations of K, Na, Al, and Ca fluctuate in the vicinity of the nanolites. (a) EDS maps corresponding to Nanolite A in Figure 3(a). (b) EDS maps corresponding to Nanolite B in Figure 3(b).

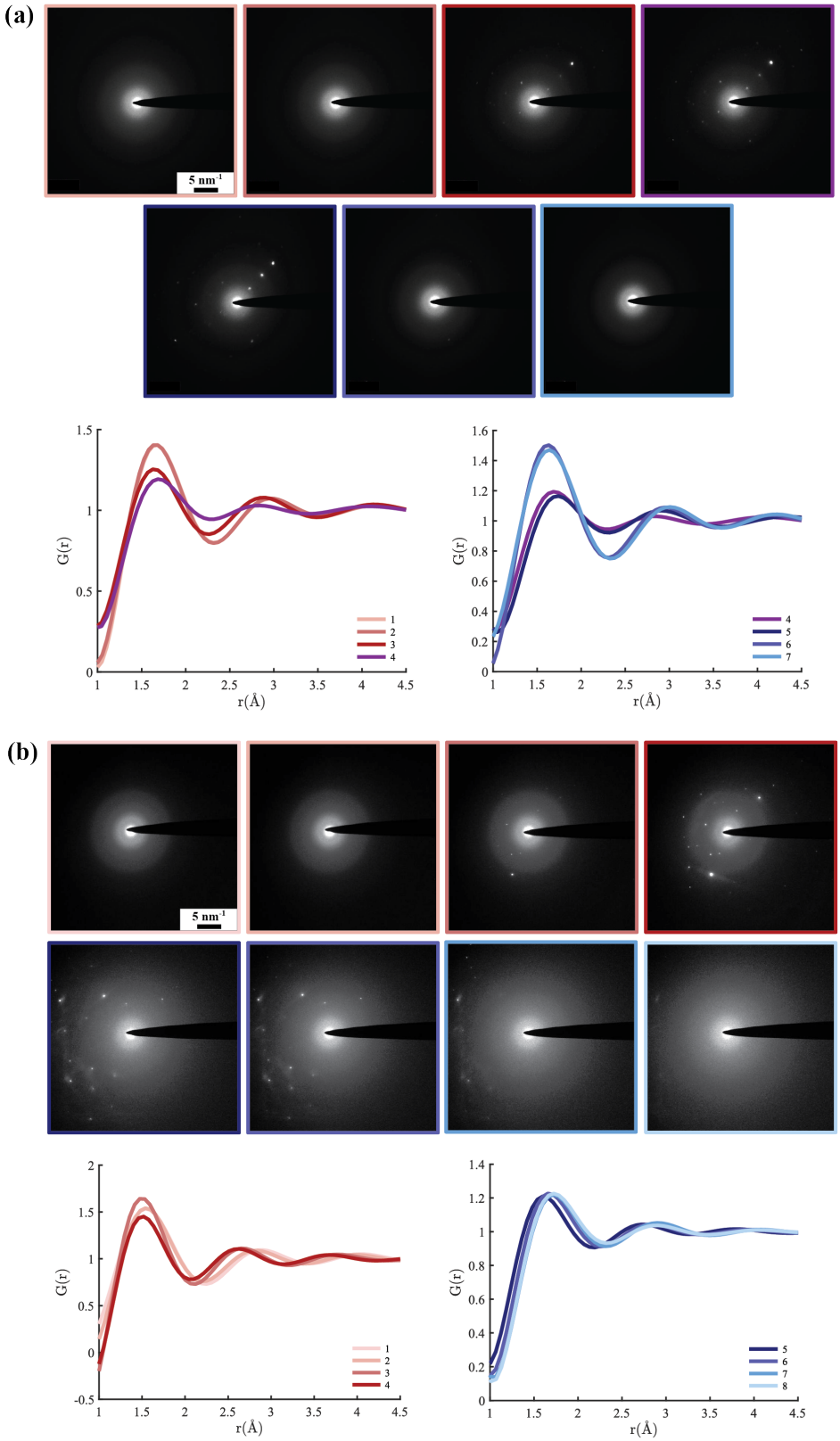

FIG. 5. Diffraction patterns corresponding to the RDF plots shown in Figure 4 and RDF plots without vertical offset. (a) Diffraction patterns collected across Nanolite A shown in Figure 4(c). (b) Diffraction patterns collected across Nanolite B shown in Figure 4(d).

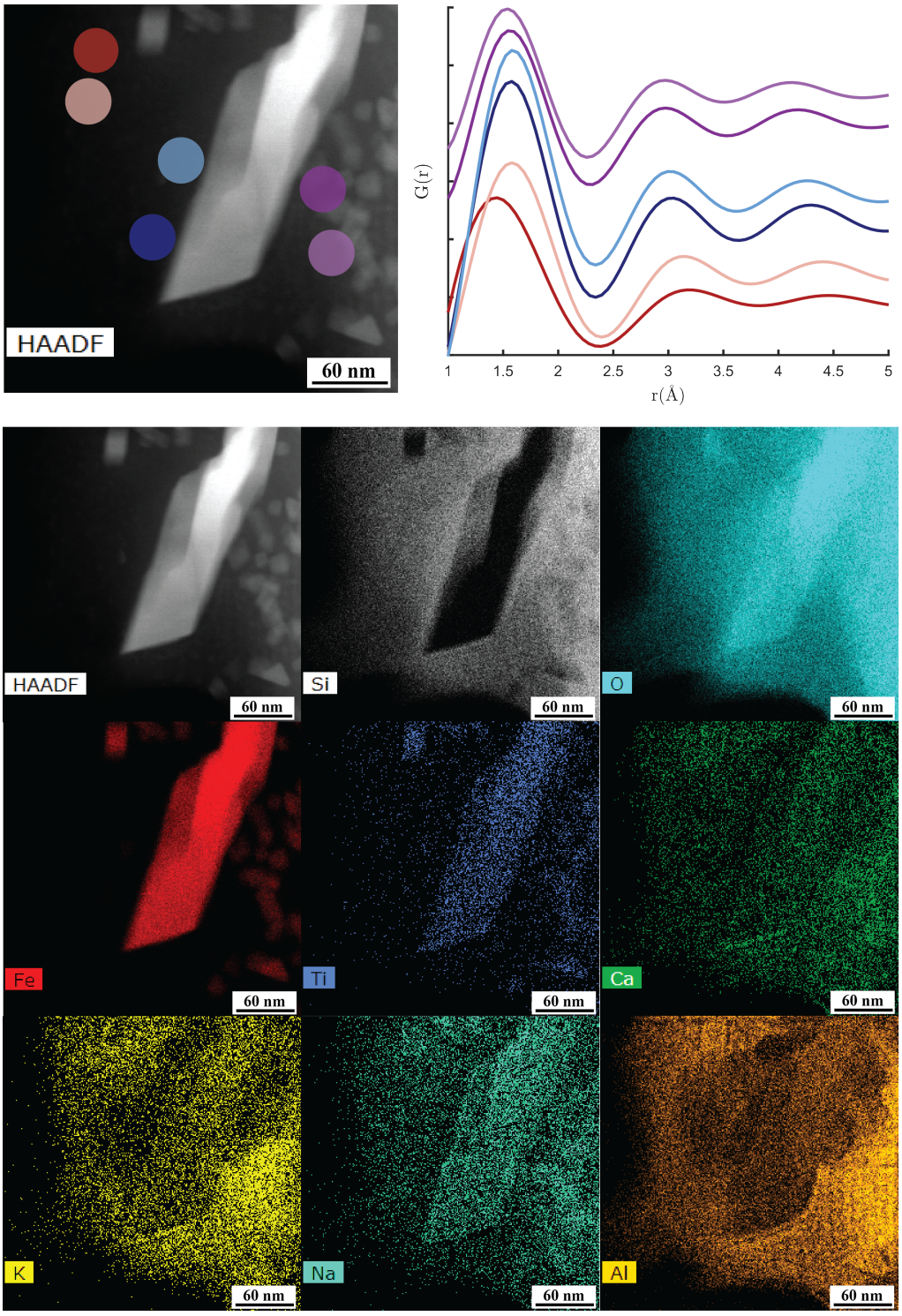

FIG. 6. Fe-oxide nanolites with Ca, K, Na, and Al depletion. A large nanolite is seen with clustered smaller nanolites surrounding it on one side. Diffraction data were collected from the matrix and small nanolites, at the interface of the large nanolite and upper matrix region, and over 100 nm above the large nanolite in the matrix. These regions are the purple, blue, and red circles, respectively. The RDFs are plotted for each position with a vertical axis offset. The nearest atomic neighbor distances are largest for the data taken over matrix areas with no nanolites that exhibit K, Al, and Ca depletion, indicated by the red curves on the RDF plot. RDF from the area with smaller nanolites embedded in the matrix exhibit the shortest average nearest neighbor distance. This reflects the accumulation of Ca, K, Al, and Na in the area. RDF from the interface of the large nanolite-matrix interface exhibit average intermediate nearest neighbor atomic distances, only slightly larger than the data collected from the matrix 100 nm above the nanolite.