Electronic Supplementary Material (ESI) for Journal of Analytical Atomic Spectrometry.

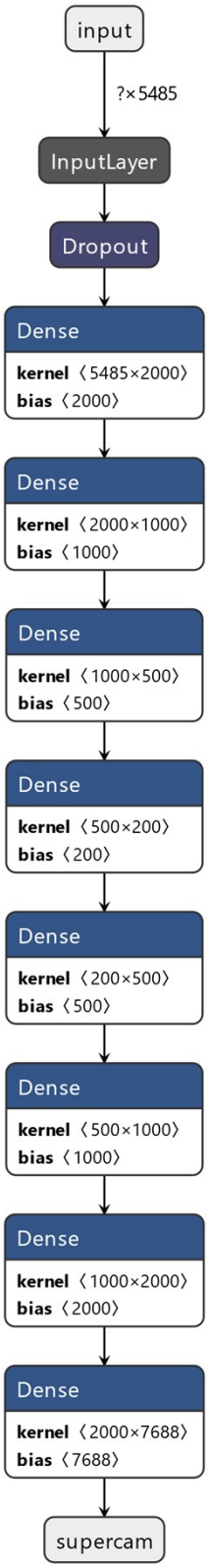

Figure S1 Architecture of the ANN used to transform ChemCam spectra into their SuperCam equivalent. The values in the angle brackets $\langle i,o \rangle$ denote the input (^{i}) and output (^{o}) dimensions of the layer. Dense refers to a fully connected layer.

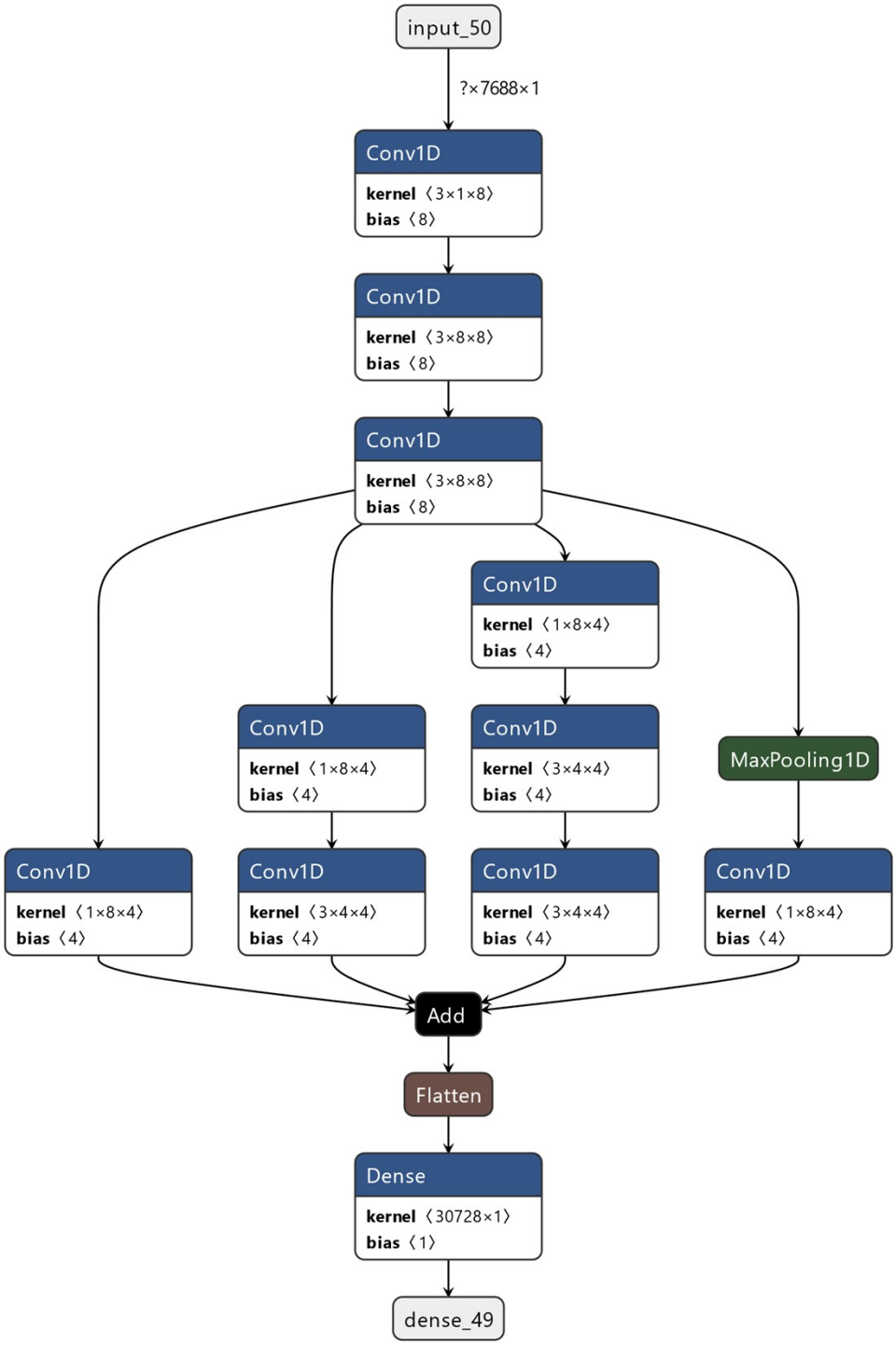

Figure S2 Architecture of the regression ANN. Conv1D refers to a 1D convolutional layer, where the values in the angle brackets $\langle w,c,n \rangle$ *denote the width of the convolutional filters (*w*), the number of channels (*n*), and the number of filters (*n*). Dense refers to a fully connected layer where the values in the angle brackets* $\langle i,o \rangle$ *denote the input (*i*) and output (*o*) dimensions of the layer. The "Add" layer concatenates the outputs of the preceding layers.*

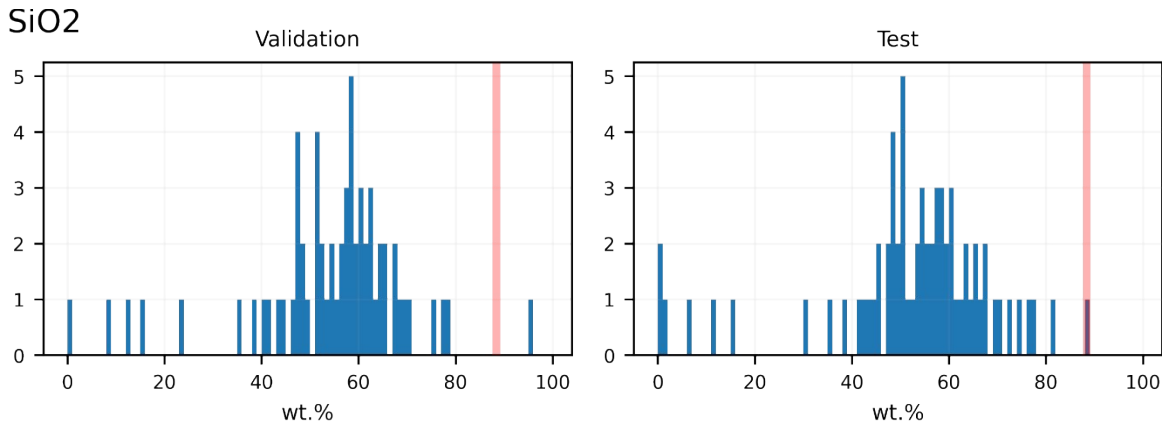

Figure S3 Distribution of the SiO_2 content in the validation and testing datasets. The vertical highlight shows the content of the target with the highest contribution to the model's error.

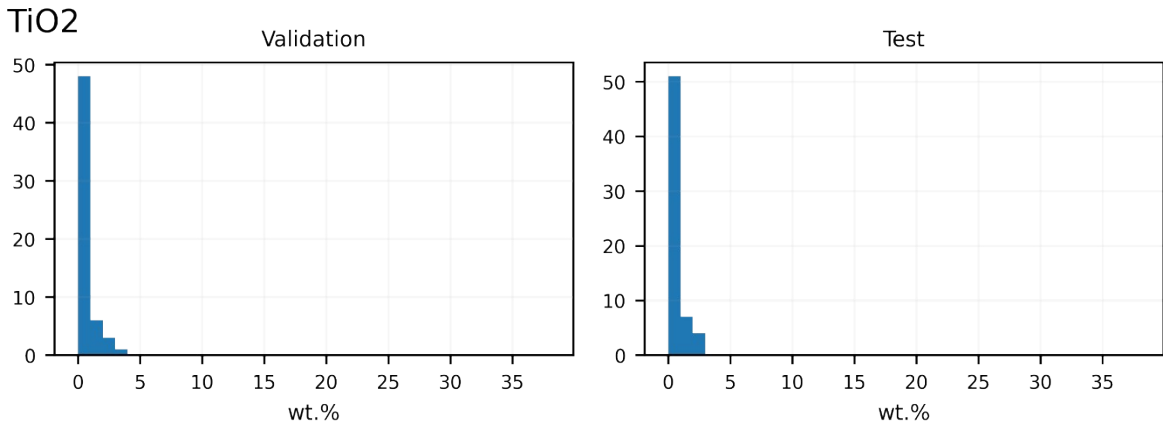

Figure S4 Distribution of the TiO_2 content in the validation and testing datasets.

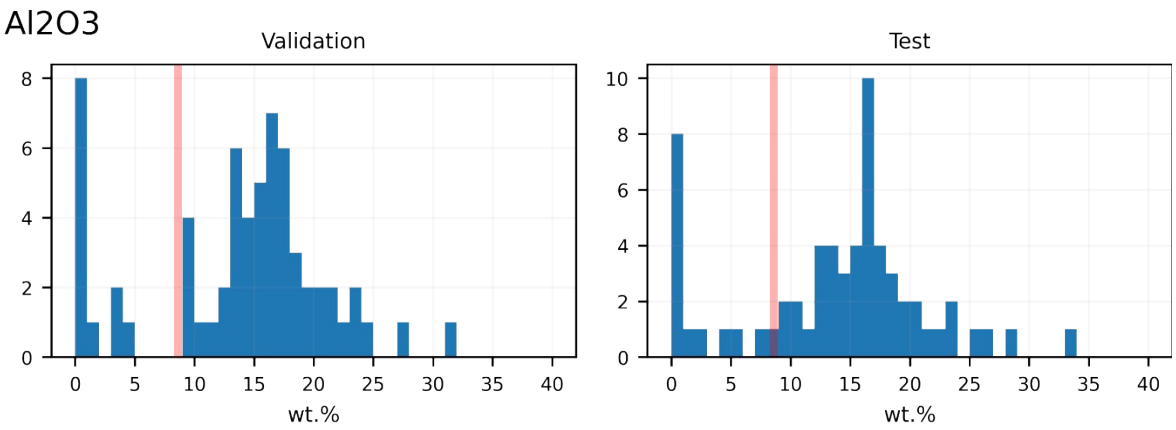

Figure S5 Distribution of the Al_2O_3 content in the validation and testing datasets. The vertical highlight shows the content of the target with the highest contribution to the model's error.

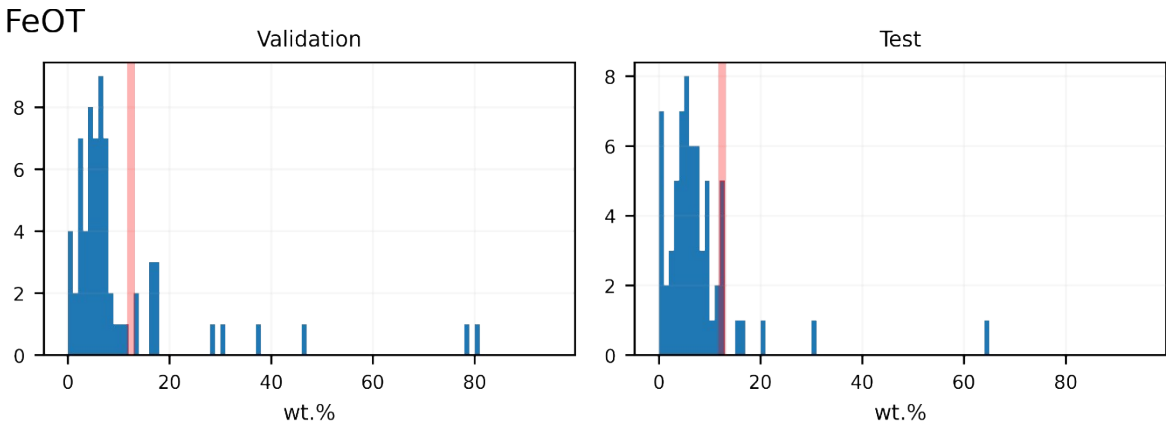

Figure S6 Distribution of the FeO_T content in the validation and testing datasets. The vertical highlight shows the content of the target with the highest contribution to the model's error.

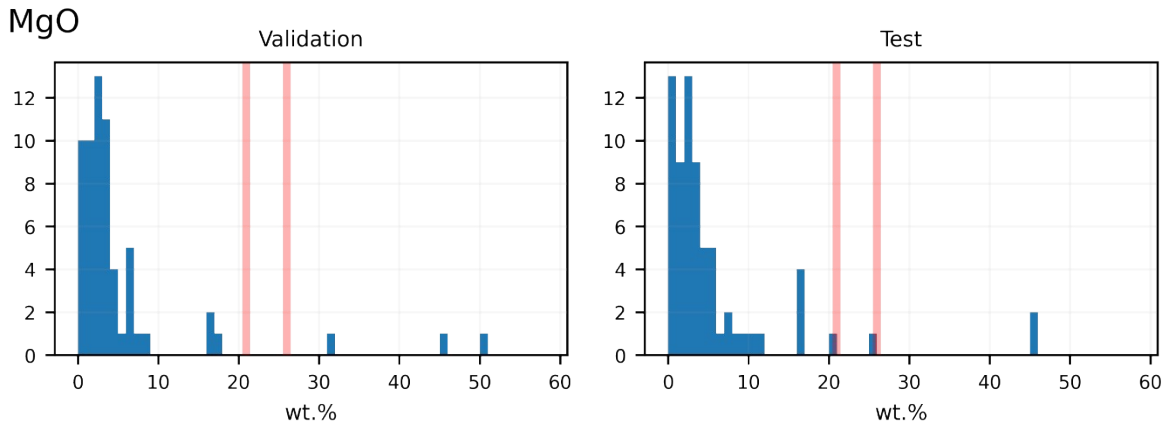

Figure S7 Distribution of the MgO content in the validation and testing datasets. The vertical highlight shows the content of the target with the highest contribution to the model's error.

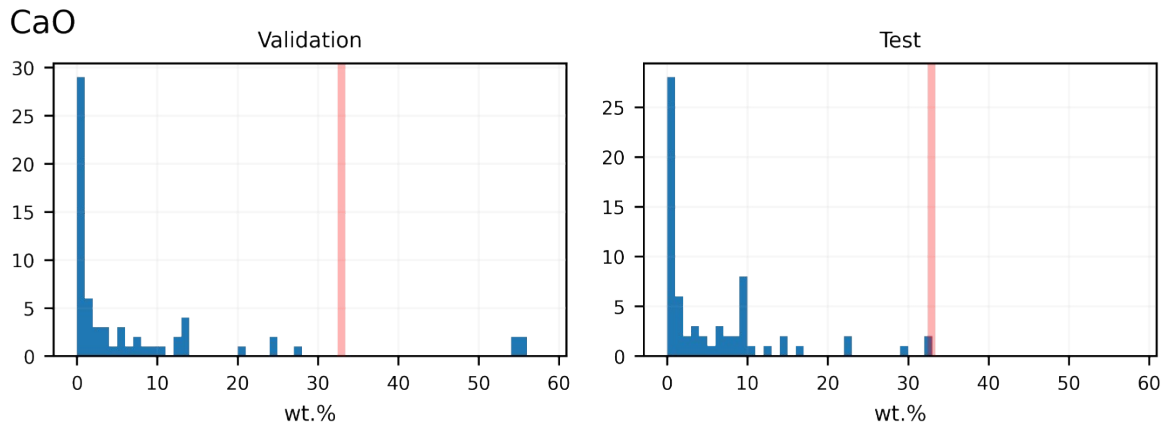

Figure S8 Distribution of the CaO content in the validation and testing datasets. The vertical highlight shows the content of the target with the highest contribution to the model's error.

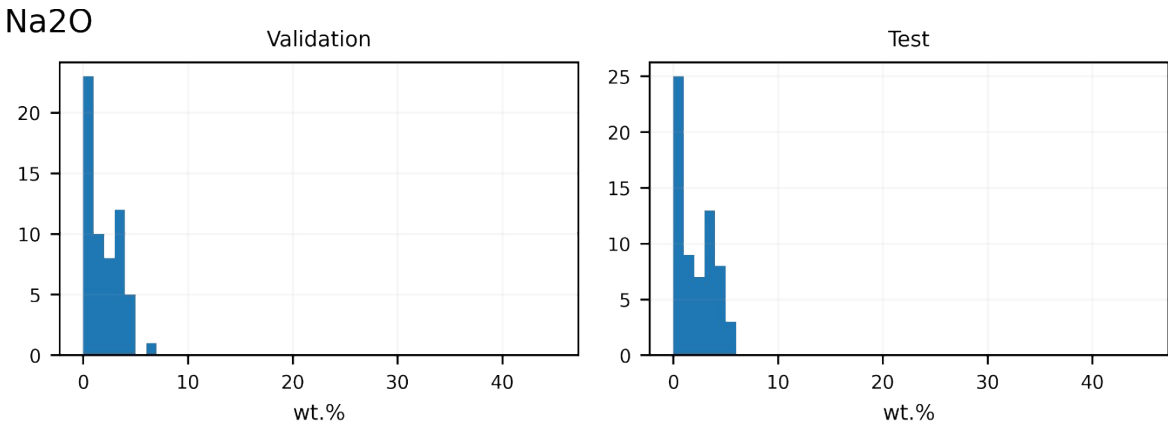

Figure S9 Distribution of the Na_2O content in the validation and testing datasets.

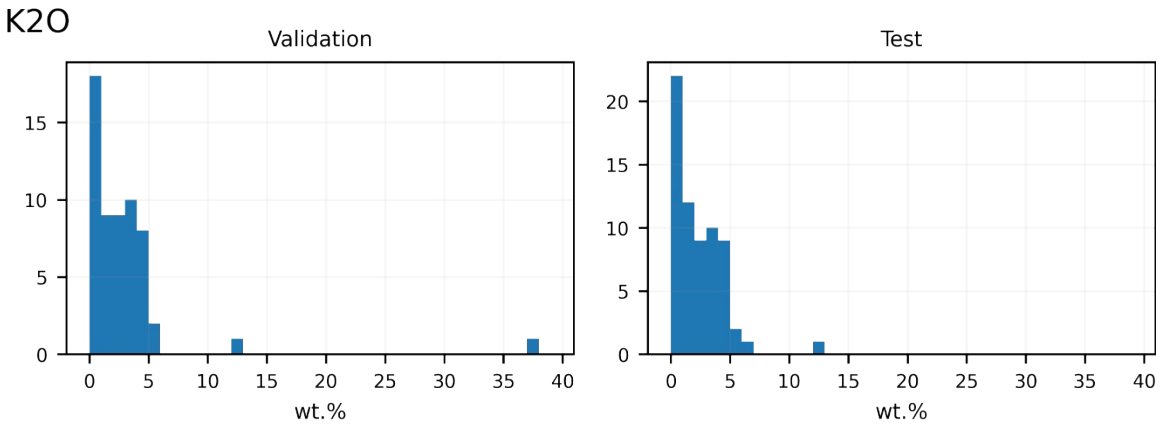

Figure S10 Distribution of the K_2O content in the validation and testing datasets.

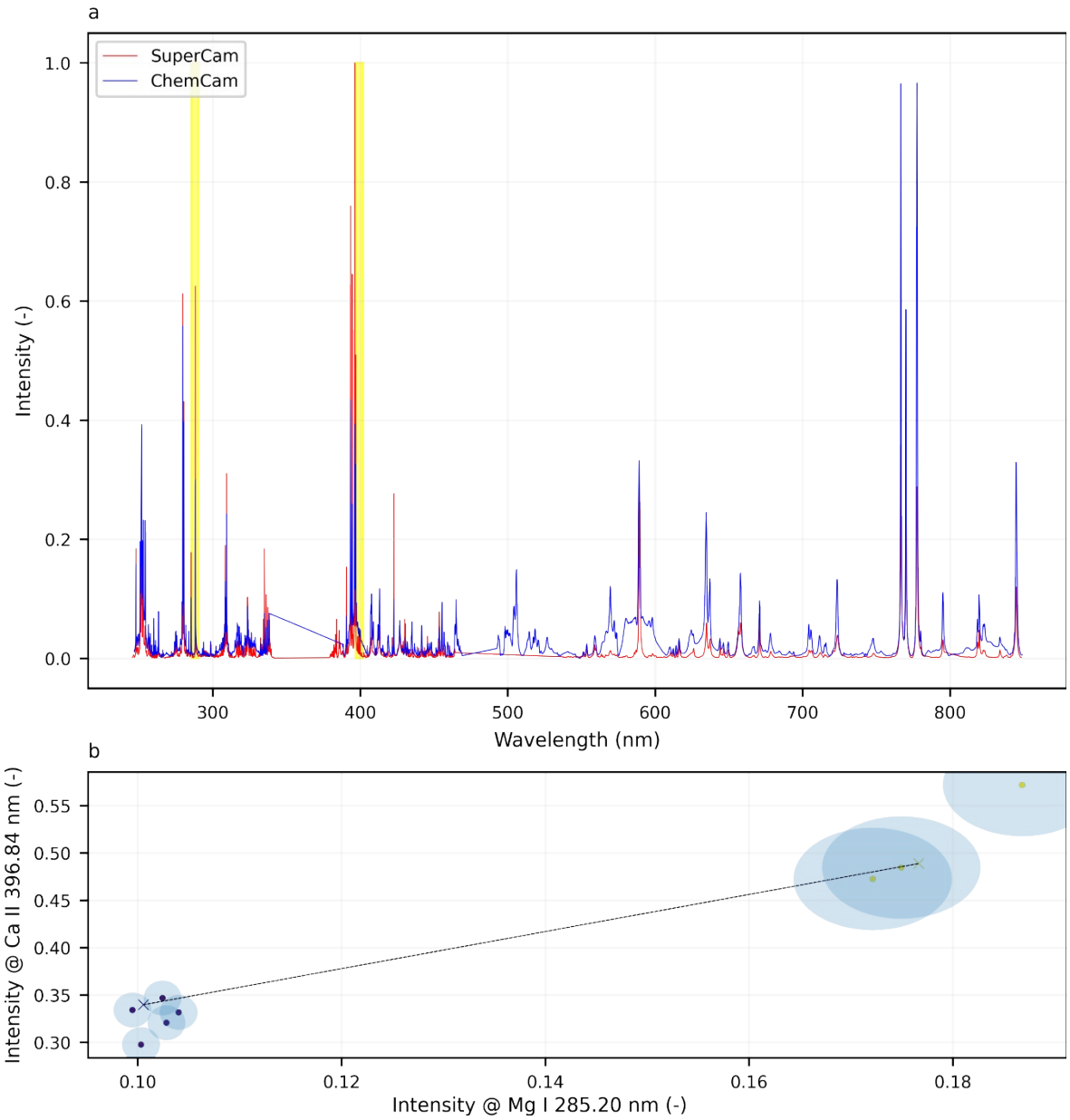

Figure S11 Graphical representation of the process applied for generating the transformation training dataset. a) Mean spectra of a target. The highlighted regions show the position of the two emission lines considered in b). b) All the available spectra of the target represented in a 2D space defined by the intensity of two emission lines. The dots represent the individual spectra, the disks show the standard deviation of all the spectra, the 'x' markers show training pair, and the dashed line connects the pair.