A combination of quantitative EDS, EDS mapping, and EXAFS spectroscopy results were utilized to probe the local atomic structure of not only novel Ru$_2$Co$_1$ NWs but also ‘control’ samples of analogous ultrathin Ru$_1$Pt$_1$, Au$_1$Ag$_1$, Pd$_1$Pt$_1$, and Pd$_1$Pt$_9$ NWs. We demonstrate that ultrathin NWs possess an atomic-level geometry that is fundamentally dependent upon their intrinsic chemical composition. In certain cases, the results obtained from EXAFS and EDS are in agreement, while in others there are discrepancies between the two methods. These cumulative outcomes indicate that only a combined consideration of both EDS and EXAFS results can provide for an accurate representation of the local atomic structure of ultrathin NW motifs.