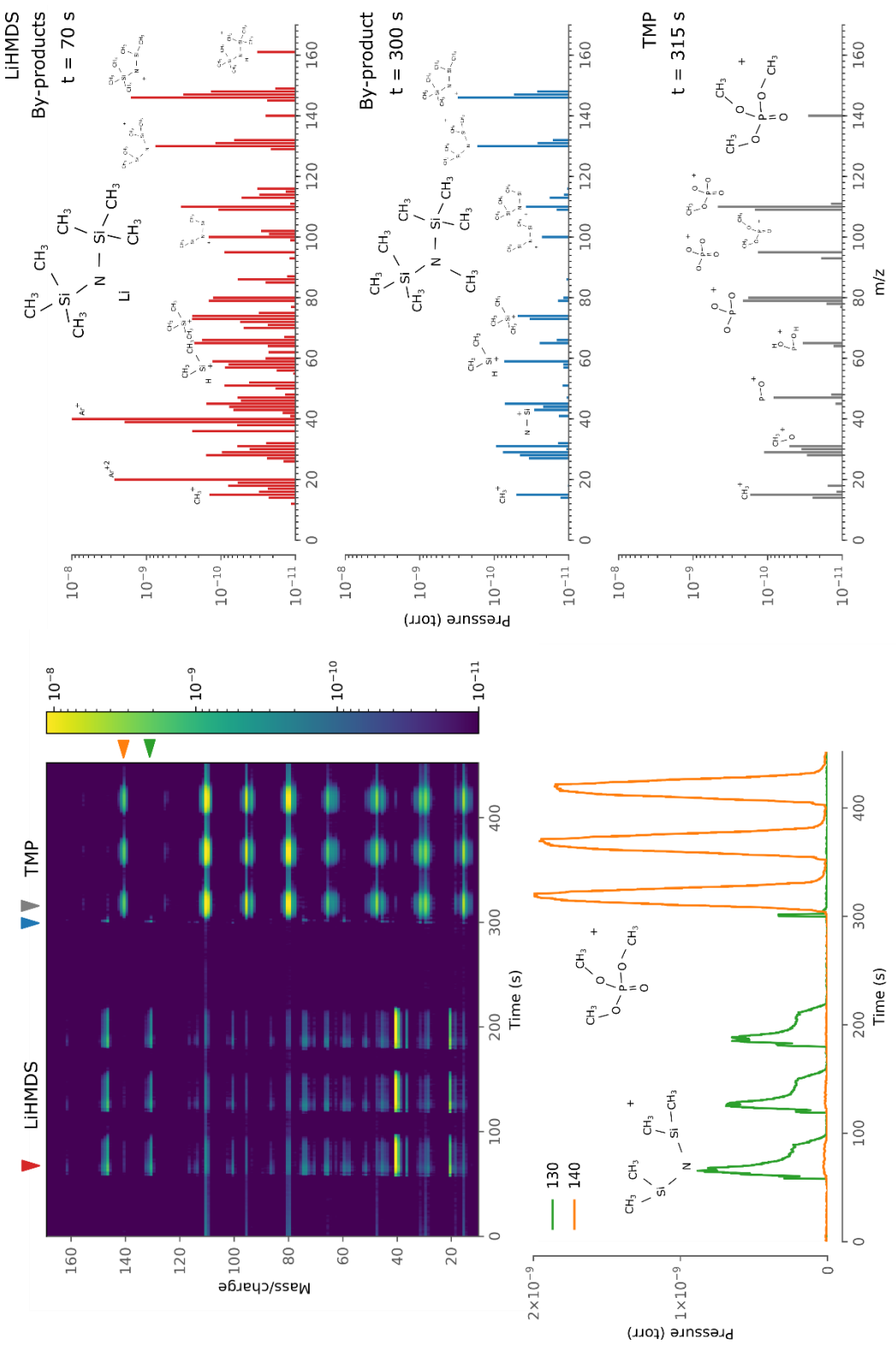


**Figure 1**. An deposition was carried out where one ALD cycle consisted of three pulses of LiHMDS followed by three pulses of TMP. This process results in a crystalline $Li_3PO_4$ film. Its reaction chemistry was analyzed with the previously described method. The heat map shows the full dataset, the other graphs are m/z slices at a specific time (top) or slices of a specific m/z for the full cycle (bottom right). In this way the first pulse shows a sign of the reaction products, where the next pulses indicate the fingerprint of the precursor molecule. At t = 70 s, the LiHMDS peak is visible, together with groups from the TMP molecule that at that time are removed from the surface (red spectrum/arrow). A clear signature is visible at t = 300, indicating that $CH_3$ from the TMP is taken by the $N(Si(CH_3)_3)_2$ ligand (blue spectrum/arrow). Finally the signature of the TMP precursor molecule (no reaction products) is observed at t = 315 s (grey spectrum/arrow). Careful analysis of this kind of dataset can unravel the complex reaction mechanism of LiHMDS and TMP.