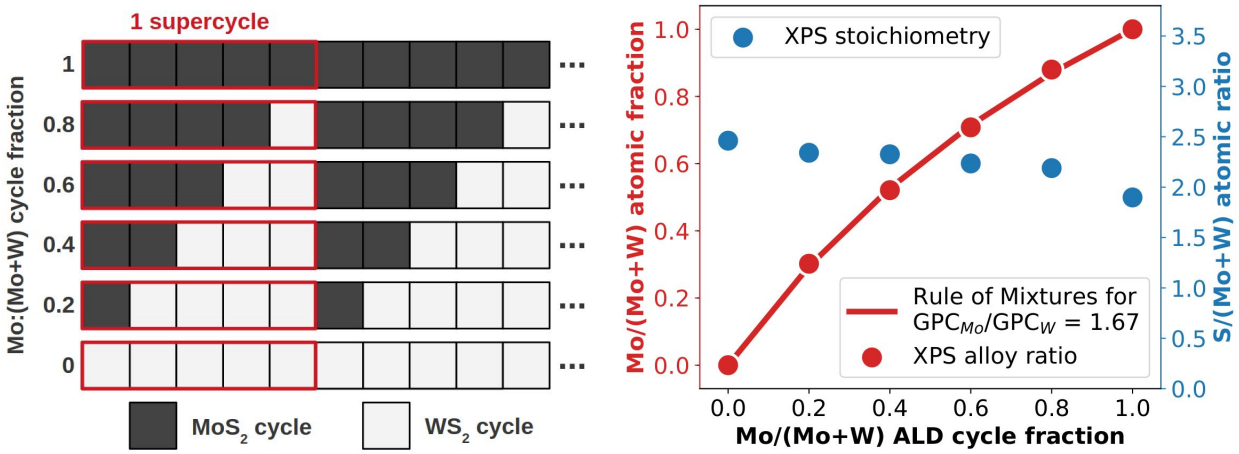

Figure 1 Excellent control over the alloy ratio *x* of the $Mo_{1-x}W_xS_2$ films as evidenced by XPS measurement (right) is achieved by manipulating the relative number of MoS_2 and WS_2 ALD cycles within a supercycle (left). The alloy ratio measured by XPS follows the rule of mixtures, indicating a well-behaved alloying process.

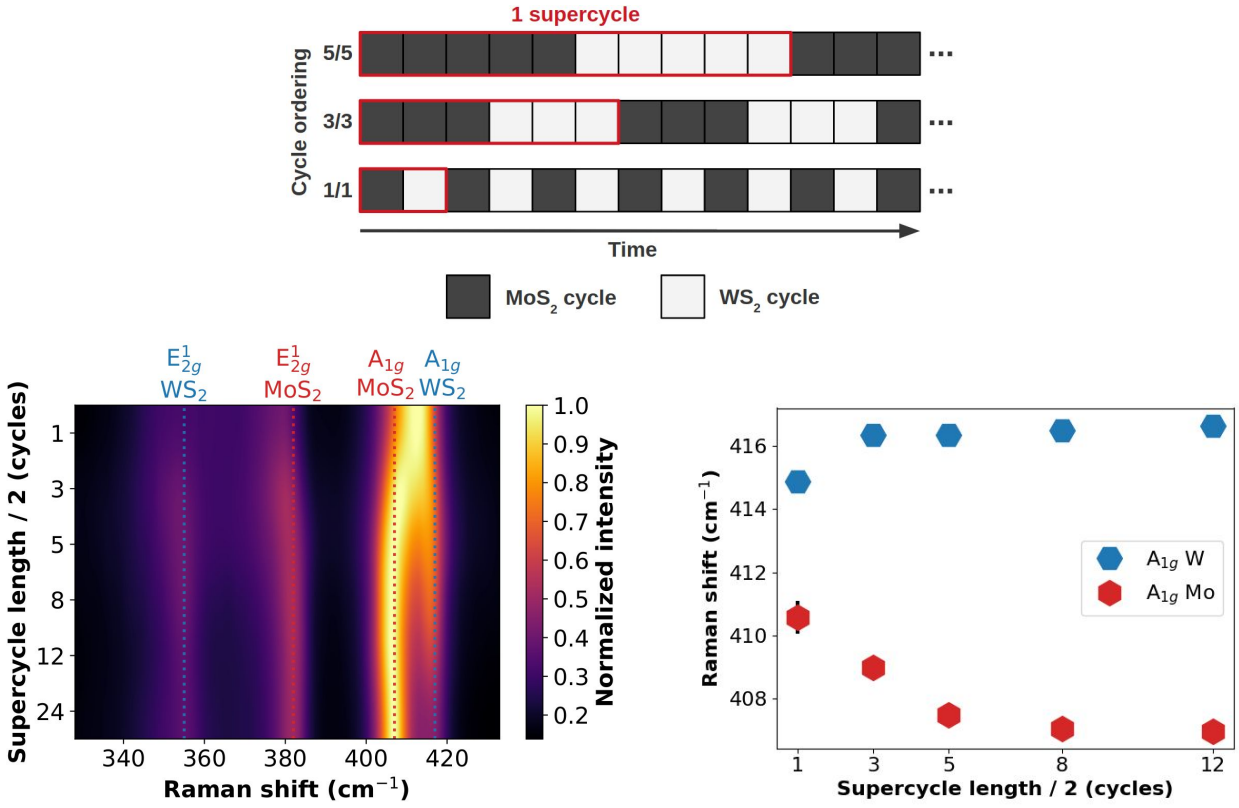

Figure 2 The atomic ordering of the $Mo_{1-x}W_xS_2$ is controlled independently of their alloy ratio by changing the ordering of the ALD cycles (top). Bottom: the ordering parameter shifts the lattice vibrational frequencies as evidenced by Raman spectroscopy (left). Specifically, the MoS_2-like and WS_2-like A_{1g} vibrational frequencies converge as the alloys are more well-mixed (right).