In this talk, I will show how chemistry and strain dictate the phase distribution, crystallite orientation, and domain size of 2D perovskite thin films. Ion size determines which phases are most stable, and therefore most likely to form. Interestingly, the right combination of organic cation and solvent produces the desired phase, but the resulting material is missing one specific emission feature. Increasing the kinetics of growth imparts mechanical strain on the 2D phase, which weakens a different emission feature. Thus, film growth parameters can be used to tune the optoelectronic properties of 2D phases in ways not available to bulk powder synthesis, which is currently the most common method for identifying new materials.