This dataset contains measurements used in the paper, ‘Evaluation of microflow configurations for scale inhibition and serial X-ray diffraction analysis of crystallization processes' from the journal, Lab on a Chip (doi: 10.1039/D0LC00239A). Included are the raw X-ray diffraction patterns, optical micrographs and scanning electron micrographs that informed our evaluation of the various flow configurations employed in the study. Also included are Matlab scripts for processing X-ray diffraction data collected from both continuous and segmented flow configurations.