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Formation of Droplets of Different Compositions in Microfluidic Channels and Applications to Protein Crystallization BO ZHENG, University of Chicago, JOSHUA TICE, RUSTEM ISMAGILOV — This presentation reports characterization and applications of formation of nanoliter droplets of different compositions in microfluidic channels. In this method several different aqueous streams were injected into a flow of an immiscible oil to form droplets in the microfluidic channels. The conditions required to form the steady flow of the droplets in a microchannel were characterized as a function of the capillary number (Ca) and water fraction. Four flow regimes that were defined by Ca and water fraction were observed and characterized. The compositions of the adjacent droplets were found lineally related and allowed indexing compositions of droplets. We also demonstrated applications of these phenomena by conducting protein crystallization in droplets in the microchannels under the condition of microbatch and vapor diffusion, with characterization by on-chip x-ray diffraction.

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