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A Microfluidic System for Screening Protein Crystallization Conditions inside Nanoliter Droplets with On-Chip X-Ray Diffraction. B. Zheng, L.S. Roach, J.D. Tice, C.J. Gerds, D. Chen, R.F. Ismagilov*, Dept. of Chemistry, The Univ. of Chicago, Chicago, IL 60637.

We employed a PDMS/glass capillary composite microfluidic system (Figure a & b) to perform hundreds of protein crystallization trials in nanoliter aqueous droplets (*J. Am. Chem. Soc.* **2003**, *125*, 11170-11171) inside X-ray capillaries (*Angew. Chem. Int. Ed.* **2004**, *43*, 2508-2511). Crystallization conditions can be screened using both microbatch and vapor diffusion techniques. For the microbatch technique, droplets containing the mixture of solutions of protein and precipitants in variable ratios are formed in the PDMS microchannel and flowed into the capillary. For vapor diffusion technique, alternating droplets of two different compositions are generated then flowed into glass capillaries. Diffusion of water takes place when the two adjacent droplets have different osmotic pressure and the oil is chosen to be water permeable. The quality of crystals is evaluated directly by on-chip X-ray diffraction. In Figure c, a 1.8 Å diffraction pattern is shown.

