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Success Rate Comparison of Sitting Drop Vapor Diffusion and Microfluidics Free-Interface Diffusion Crystallization. Timothy Lekin, Brent Segelke, Dominique Toppani, BBRP, LLNL, 7000 East Ave., L-448, Livermore, CA 94551 USA.

We have carried out a series of experiments with the intent to conduct a head-to-head hit rate comparison of two crystallization methods, sitting drop vapor diffusion (SDVD) and nano volume microfluidics free-interface diffusion (MF-FID). It is apparent that MF-FID requires far less material per experiment than other methods but the hit rate of this method has not been rigorously compared to other crystallization methods. This is important because if the MF-FID method has a significantly lower hit rate then the benefit of material savings is reduced. We setup a large number of crystallization experiments for each of 5 proteins using our existing automated SDVD approach and with MF-FID using the Fluidigm Topaz 1.48 crystallization chip. Crystallization screening conditions were generated by random combination using our CRYSTOOL design engine. The experiments for our study were manually observed over a period of 1 month. The results of the comparison are quite dramatic and indicate that the success rate of crystallization is 2-8x higher using MF-FID compared to SDVD. We also examined the hit rate by reagent in both SDVD and MF-FID. Again the differences are striking; the hit rates in SDVD are nearly equivalent with either PEGs or salt whereas in MF-FID the hit rate is much higher for PEGs then either salts or alcohols.