Acoustic droplet ejection: from crystallization through time-resolved SFX

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On demand acoustic droplet ejection is a general, touchless method that use focused sound waves to eject picoliter to nanoliter volumes from one place to another. A spot-focused piezoelectric transducer is driven by a waveform pulse with frequency and amplitude that ultimately impact droplet size and velocity, respectively. A wide variety of solutions can be manipulated, from crystallization reagents and chemical libraries to relatively viscous slurries of microcrystals. Droplets can be ejected from any well within a range of microplates, or launched from a custom, 3D printed and refillable micro-well. The droplet destination can be any well within a microplate, a known location such as a mounted crystal or any spot within MiTeGen micromesh, an optically and X-ray transparent transport belt, or directly into the XFEL interaction zone. Several examples of applications will be described, including on-demand acoustic injectors for SFX and spectroscopic data collection at the LCLS.