Chaotic Advection Mixer for Capturing Transient States of Diverse Biological Macromolecular Systems with Time-Resolved Small Angle X-ray Scattering

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Time-Resolved SAXS: Flow-Focused Diffusive Mixers



Rapidly mix in small molecules to initiate chemical reactions and probe them with various structural techniques at the single millisecond timescale and beyond. [1,2,3,4,5]



Efficient Mixing with Small Molecules (ligands/ions)



Inefficient Mixing with Large Molecules (proteins/RNA/DNA)

Small molecules diffuse quickly on the length scales inside our diffusive mixers, but large biological macromolecules diffuse more slowly than the timescales of interest.

Diffusive mixers also require the ligand to be highly soluble to help drive fast mixing. This can be a limitation for many drug targets, which may be partially hydrophobic or not available in large quantities

Shorter length scales are needed to achieve efficient mixing of large biological macromolecules.

These reduced distances have the additional benefit of reaching fast mixing while using lower ligand concentrations than that of diffusive mixers.

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As the two fluids traverse each helical element, they are stretched, split, and stacked on top of each, creating thin strips of liquid that are as thin as 200 nm. These short length scales allow for much more efficient mixing, including for large biological macromolecules, ligands that have low solubility, and samples in viscous media





