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Novel Crystal Delivery Medium for Serial Femtosecond Crystallography

Serial femtosecond crystallography (SFX) is a relatively new protein and macromolecule structure determination technique which uses ultrashort laser pulses to obtain high resolution structural information with minimal damage. It allows for nanosized macromolecular crystal structures to be determined; previously these were not amenable to x-ray crystallography. However, most SFX experiments deliver the sample in a liquid jet, which moves at a fast rate and leads to high sample consumption. It is not uncommon to consume 10-100 mg of protein for the collection of a complete data set, which is problematic for proteins that can only be produced in small amounts, such as membrane proteins.

Researchers at the Biodesign Institute of Arizona State University have developed a novel crystal-delivery medium for SFX which allows for the use of smaller sample volumes. They found that samples delivered in this medium resulted in a reduction of sample consumption by a factor of at least 100 fold. This allows for SFX data collection on many new proteins which are currently sample limited. Using this medium, phycocyanin, a multi-subunit accessory pigment to chlorophyll in cyanobacteria, was solved to 2.5Å resolution after 1.9 hours of sample collection, using just 300 µg of microcrystals. This medium has also been shown to be compatible with half a dozen other protein crystals including temperature sensitive, membrane proteins.

This medium is quite versatile, having compatibility with both soluble and membrane proteins as well as a variety of crystallization methods. It would find great utility in drug discovery.

Potential Applications

- Serial femtosecond crystallography
 - Drug discovery/design
 - Studying chemical/molecular interactions
 - Basic research

Benefits and Advantages

- Low sample volume – reduces protein consumption by at least 100-fold
- Low background scattering
- Can be used with a diverse population of proteins including soluble and membrane proteins
- Compatible with a variety of crystallization methods

- Can deliver the crystals at a wide range of temperatures down to 40C

For more information about the inventor(s) and their research, please see [Dr.](#)

[Fromme's directory webpage](#)