Cryo-FIB Milling Improves MicroED Data and Structures

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MicroED is a cryo-EM method that determines crystal structures from nanometer sized crystals. Many protein crystals will only grow to a few micrometers in size, making them too small for traditional X-ray crystallography, but too large for MicroED. We demonstrate that using a beam of gallium ions to etch away excess protein material can quickly shave protein crystals down to sizes amenable to MicroED investigation without sacrificing resolution. Recently investigations have demonstrated that ion-beam milling can be used to excavate protein microcrystals from deep within viscous solutions that cannot be blotted away using standard sample preparation techniques, such as lipid bicelles or lipidic cubic phase. Furthermore, ion-beam milling improves data quality by removing vitrified solvent, carbon, and crystalline material in order to optimize data quality. The state of the art of ion-beam milling along with several examples of recent structures determined using the method will be detailed.

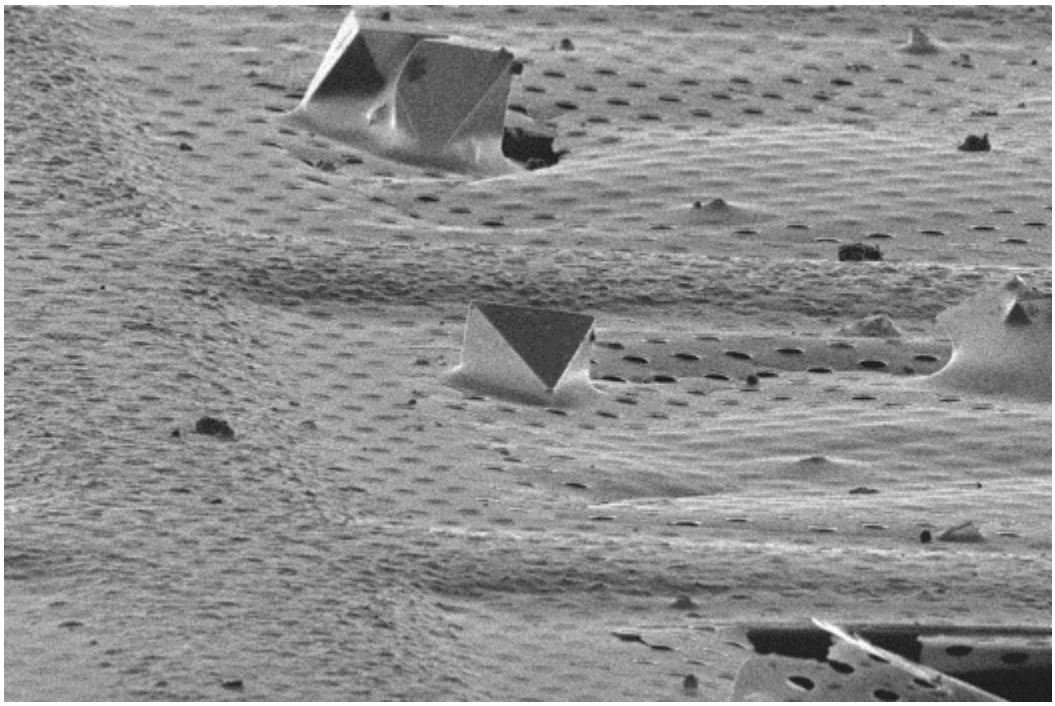

Figure 1