Cryo-Electron Microscopy for high-resolution structure determination of biomolecules

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The Instruct Center France I (Illkirch/Strasbourg, France) offers a wide variety of services to structural biologists, ranging from protein production, purification and biophysical characterization to X-Ray crystallography and single particle transmission Cryo-Electron Microscopy (Cryo-EM) . In this talk, I will describe our efforts in Cryo-EM, which is the center flagship platform. In the last decade, advances in sample preparation, EM sources, and data treatment have allowed the measurement of EM images and the subsequent calculation of electron density maps to resolutions high enough to be interpretable in terms of atomic models. This “resolution revolution” has opened the possibility of structure determination of large macromolecular complexes which were extremely difficult to obtain by X-Ray crystallography, and has culminated in the 2017 Nobel chemistry prize given to the pioneers of Cryo-EM, Jacques Dubochet, Joachim Frank and Richard Henderson. I will summarize the principles of Cryo-EM, describe the equipment available at the Instruct Center France I and give examples of the results obtained. Furthermore, I will discuss other methodologies on which we have developed a particular expertise, such as analytical ultracentrifugation for protein characterization.