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Laser-microdissection of protein crystals down to submicron dimensions

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Abstract

We studied laser-microdissection of “standard” and Langmuir-Blodgett (LB) nanotemplate protein crystals in glycerol solution. The time required for microdissection was significantly longer for LB-crystals as compared to standard-crystals which also more rapidly dissolve. Microfragmentation of lysozyme crystals was observed after extended solvent exposure. Synchrotron radiation nanobeam mapping allowed localizing and aligning cryofrozen lysozyme microfragments. 3D data-sets obtained from two microfragments were refined to atomic resolution. The well-defined electron density maps showed no evidence for damage of radiation of sensitive side-groups. Our results suggest applications of laser-microdissection techniques in structural studies on crystals with a high mosaicity. They also provide a new window for the characterization of protein crystal organization down to the submicron scale, pointing to a new emerging biophysical technique.

Biography

Evgeniya Peshkova (alias Eugenia Pechkova) is presently an assistant professor of Biochemistry and Biophysics at the University of Genova Medical School. After taking her Doctoral degree in Chemistry at Moscow State Lomonosov University in 1998, and the PhD in Biophysics at University of Genova in 2003, was Scientific Director of Fondazione EL.B.A. (Electronic Biotechnology Advanced) and Principle Investigator of a big FIRB research grant on Organic Nanotechnology. Later she acquired the scientific responsibility of the laboratory of Nanobiocrystallography at the Nanoworld Institute, University of Genova. In 2007 she worked as a Visiting Scientist at the European Synchrotron Radiation Facility (ESRF) in Grenoble in Macromolecular Crystallography and Soft Condensed Matter, remaining up to now one of the PI of Radiation Damage BAG. Author of more than 50 international scientific publications (ISI-SCI), 2 patents, several chapters to books and textbooks. Author of "Proteomics and Nanocrystallography" and editor of “Synchrotron Radiation and Nanobiosciences” (with Claudio Nicolini), “Structural Proteomics and Synchrotron Radiation” (with Christian Riekel) within the Pan Stanford Series on Nanobiotechnology. Her main scientific interest are structural proteomics, functional nanoproteomics and nanocrystallography.