M1-Molecular and Cellular Biology (MCB)
Internship Proposal Form
Chemistry-Biology Department

Laboratory Address and Affiliation:

Institute of Structural Biology (IBS), Mass spectrometry laboratory, 71 Avenue des Martyrs, 38044 Grenoble cedex 9

Laboratory/Team Research area (Keyword)

Mass spectrometry, intact biomolecules, macromolecular complexes, protein primary sequence and post-translational modifications

Summary of the Proposed Internship Project (10 lines)

Title: Mass spectrometry-based sequencing of proteins using a MALDI-TOF/TOF instrument

DESCRIPTION:
The primary sequence and post-translational modifications (PTMs) of proteins influence their structure and function, tuning their actions in key cellular processes. The IBS MS laboratory aims to characterise proteins and their PTMs using mass spectrometry (MS). MS can assess the mass of biomolecules with high accuracy, sensitivity and rapidity. We acquired a new mass spectrometer, which allows us to sequence intact proteins and to determine type, number and position of their PTMs.

Methodologies and/or Techniques to be used

Using a Matrix Assisted Laser Desorption Ionisation (MALDI) time-of-flight (TOF)/TOF, the student will optimise sample preparation conditions to sequence proteins and localise their PTMs. She/he will assess different types of matrices, sample deposition and matrix crystallisation. She/he tests distinct types and concentration of samples (both soluble and membrane proteins) and laser intensity. Overall, she/he will aim to maximise mass resolution, accuracy, sensitivity and sequence coverage.

Person to contact:

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Additional information

Boeri Erba E et al. Characterizing Intact Macromolecular Complexes Using Native Mass Spectrometry. Methods Mol Biol. 2018;1764:133-151. doi: 10.1007/978-1-4939-7759-8_9
Boeri Erba E, Petosa C. The emerging role of native mass spectrometry in characterizing the structure and dynamics of macromolecular complexes. Protein Sci. 2015 Aug;24(8):1176-92. doi: 10.1002/pro.2661
Signor L, Boeri Erba E. Matrix-assisted laser desorption/ionization time of flight (MALDI-TOF) mass spectrometric analysis of intact proteins larger than 100 kDa. J Vis Exp. 2013 Sep 9;(79). doi: 10.3791/50635