Protein Design for Therapeutic and Biotech Applications

Session co-chairs: *Carlos J. Camacho (University of Pittsburgh, US) and Isabelle André (CNRS, University of Toulouse, France)*

In the last decade, protein design has experienced important methodological advances. Methods have been used to redesign natural enzymes to extend their fields of application but also to design novel proteins from scratch. More recently, these technologies have been integrated in rational engineering approaches for therapeutic purposes. From the redesign of protease specificity, such as thrombin involved in blood coagulation, to synthetic peptides for a number of MHC class-II-associated autoimmune disorders. The goal of this session is to bring together the next generation of innovators that translate knowledge into applications on a broad range of topics, providing an opportunity for cross-talk and "out of the box" collaboration. Topics covered in the session include the understanding of the aggregation and control of misfolded proteins often responsible for hard to treat neurodegenerative diseases; the application of computer-guided and structure-based design of immunogens and immunization regimens, with the goal of inducing broadly neutralizing antibodies against HIV and other pathogens; and, research that have leverage the interface of protein engineering and synthetic biology to develop new concepts and software tools for rational engineering of enzymes and bacteria.

Our line up of speakers include Dr. Jiri Damborsky from Masaryk University, Czech Republic; Dr. Daniela Grabs, from Arzeda Corp, Seattle, WA, USA; and, Dr. Nikolay V. Dokholyan from the University of North Carolina at Chapel Hill, NC, USA. Dr. Damborsky, an innovator in the area of protein engineering will be speaking about new concepts for the efficient rational design of enzymes for biotechnological applications. Dr. Daniela Grabs, an intellectual leader that made ground-breaking research designing new enzymes for reactions not catalyzed by naturally occurring biocatalysts will be speaking about applications of these new functionalities and their impact in a sustainable future. Finally, the lab of Dr. Dokholyan is at the forefront of synthetic biology, re-designing existing biological systems in order to understand spatio-temporal regulation of fundamental processes in life, and his presentation will discuss the control of kinase activity in living cells.