BIOMATERIALS

Forces in Biomolecular Systems SFB 863

Molecular Quality Control in the Cell:

Structural Mechanisms, Cellular Pathways and Molecular Engineering

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Abstract:

Proteins are the functionally most diverse class of biomolecules. Their functional diversity is made possible through structural diversity. Proteins are synthesized in the cell, however, as a linear chain of amino acids that first has to adopt a well-defined three-dimensional structure before being able to fulfill its biological functions. This process is called protein folding and either occurs spontaneously or is assisted by dedicated protein folding helpers, a class of proteins named molecular chaperones. Molecular chaperones ensure that only properly folded proteins are present in the cell or, even more importantly, secreted from the cell where they fulfill long range functions from signaling to immune defense. Using an interdisciplinary approach from protein biochemistry and biophysics to cell biology we study the mechanisms and machinery that underlie these processes summarized as molecular quality control. We have a particular interest in how protein folding and assembly are coordinated on the molecular level. A detailed understanding of how proteins acquire their native structure and how the cell controls and regulates this process is a prerequisite for targeted interventions in molecular engineering and human therapy.

Friday, June 12th, 2015, 13:00

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