

Folding and Unfolding Mechanisms of Iron Sulfur Proteins Revealed by Single Molecule Force Spectroscopy

Hongbin Li

**Department of Chemistry, University of British Columbia,
Vancouver, Canada**

Abstract:

Metal ions play important roles in biology. In metalloproteins, metal centers serve as active sites, as well as important structural elements to facilitate protein folding and assembly. However, it is challenging to investigate the unfolding-folding of metalloproteins due to the loss or decomposition of the metal center. Here, we combine single molecule force spectroscopy and protein engineering to investigate the unfolding-refolding mechanism of small iron sulfur proteins rubredoxin and ferredoxin. Our results revealed that the unfolding of both proteins are characterized by the initial partial unfolding of the protein followed by the rupture of the iron sulfur center and complete unraveling of the protein. However, differences in the iron chelation motif in rubredoxin and ferredoxin gave rise to distinct rupture patterns of the iron sulfur center. After complete unfolding, rubredoxin and ferredoxin were observed to refold to its holo-native form with the fully reconstituted iron sulfur center. Moreover, rubredoxin was observed to display folding fatigue due to the dissociation of the ferric ion from the unfolded rubredoxin. Our results open new avenues towards investigating the folding mechanism of metalloproteins at an unprecedented resolution.

Friday, June 22nd, 2018, 13:00

Room PH 127