

Influence of Fluorinated Amino Acids on Thermodynamic and Mechanical Stability of Poly-Ubiquitin

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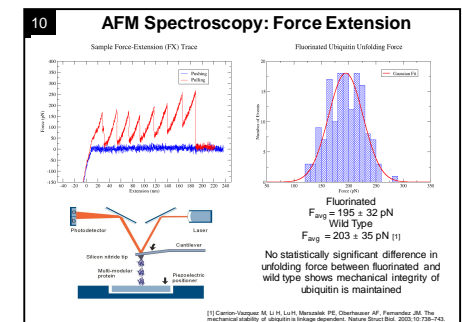
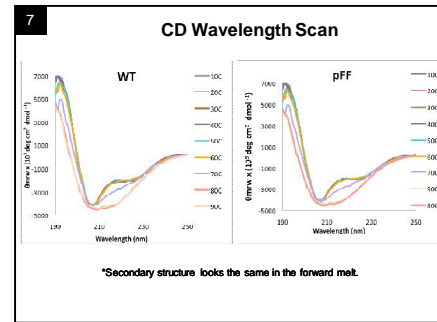
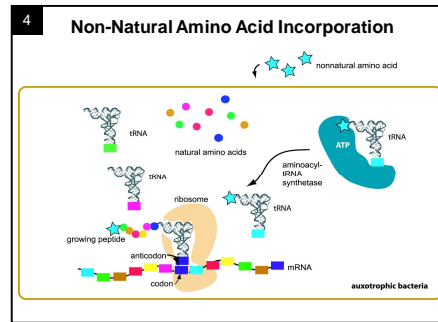
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1 Abstract

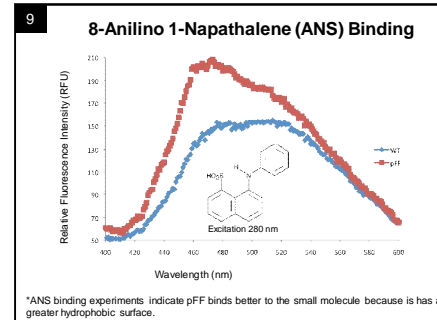
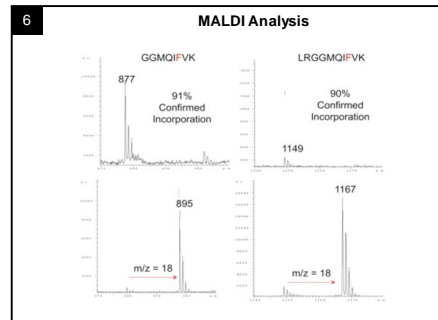
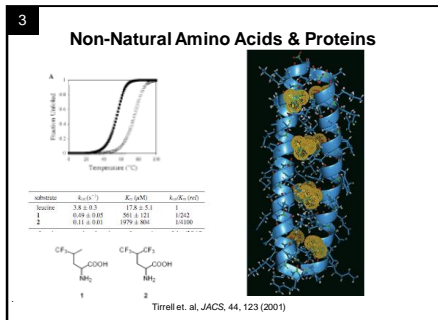
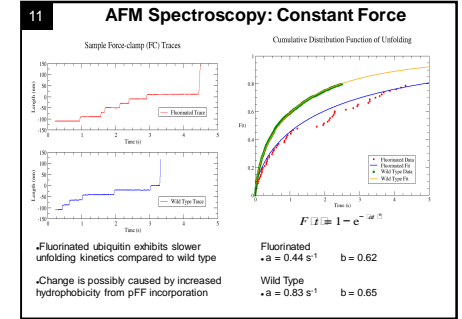
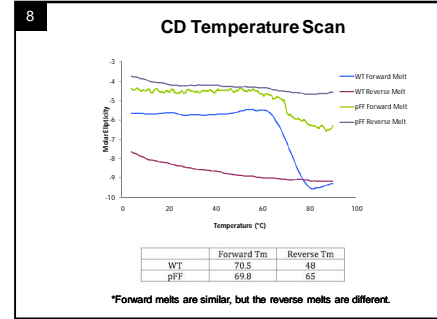
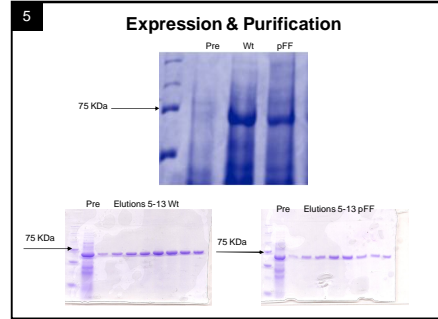
The thermodynamic and mechanical stability of proteins rely on the delicate balance of hydrophobic and hydrophilic amino acids. In particular, the presence of fluorinated amino acids plays a critical role in the overall structure and folded state. Fluorinated amino acids have been integrated into proteins to stabilize and control super molecular assemblies. To explore the capacity of fluorinated amino acids to manifest the thermodynamic and mechanical stability of proteins, we characterized proteins via mass spectrometry, circular dichroism, and biophysical AFM.



2 Poly-Ubiquitin

MOIEVKLTGKTTILEVPSDITENKAKIQDKE
GIPDQORLFAAGKQLEDGRTLSYNIQKESTL
HLVLRGGMIOFVKTLTGKTTILEVPSDITEN
KAKIQDKEGIPDQORLFAAGKQLEDGRTLSYNI
IQKESTLHLVLRGGMIOFVKTLTGKTTILEVPS
SDITENKAKIQDKEGIPDQORLFAAGKQLEDG
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VKTLTGKTTILEVPSDITENKAKIQDKEGIPD
QORLFAAGKQLEDGRTLSYNIQKESTLHLVLR
GGMIOFVKTLTGKTTILEVPSDITENKAKIQD
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GRTLSYNIQKESTLHLVLRGGMIOFVKTLTG
KTTILEVPSDITENKAKIQDKEGIPDQORLFA
GKQLEDGRTLSYNIQKESTLHLVLRGGV

Brujic, J., Hermans, R., Walther, K., Fernandez, J., Nature physics, 2, 282 (2006)



12 Conclusions & Future Work

- Successfully incorporated pFF
- Similarities in temperature scans as well as unfolding forces suggest mechanical stability of ubiquitin remains
- Fluorination caused two-fold decrease in unfolding kinetics possibly due to increased hydrophobicity
- We will continue incorporation of other non-natural amino acids into poly-ubiquitin, as well as varying pH of buffer solution, small molecule binding, and explore their impact on stability and mechanical properties further using CD and AFM techniques

