

THz CD & Protein Folding

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Project Background

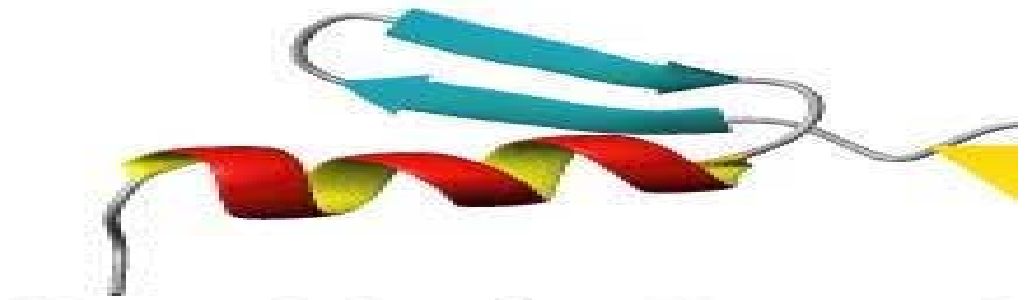


THz Circular Dichroism & Ion-Ion Protein Folding Effects

- Scope – What are we trying to do? Why?
- Funding – Sources & Rationale
- Status – Where did we start, Where are we going?

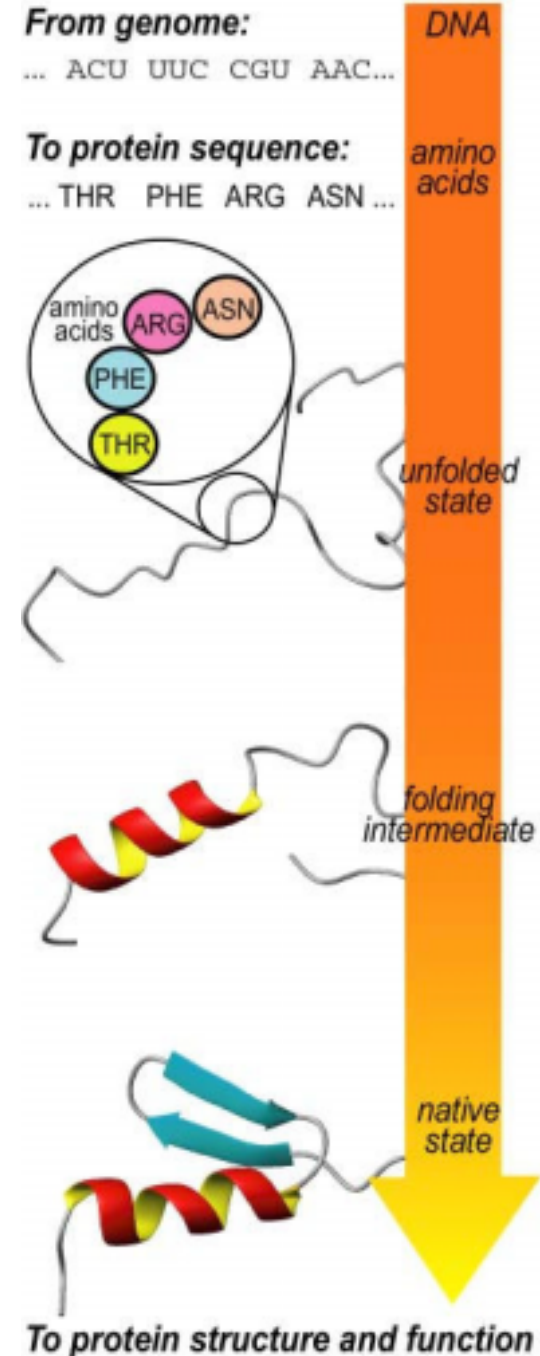
Project Background

- THz Circular Dichromism
 - Scope
 - Funding
 - Status



Project Background

- Ion-Ion Protein Folding Effects
 - Scope
 - Funding
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Protein Folding – Methods (Materials)



Protein Folding – Methods (Materials)

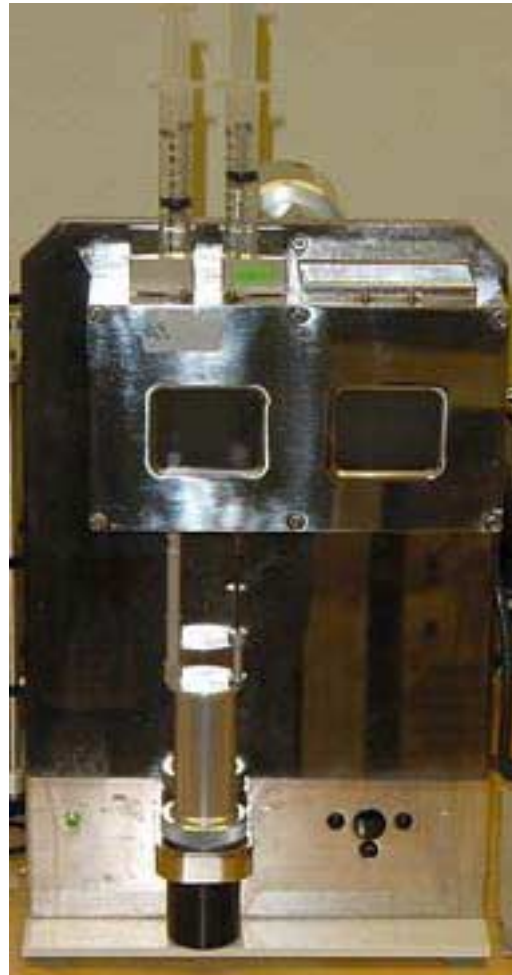
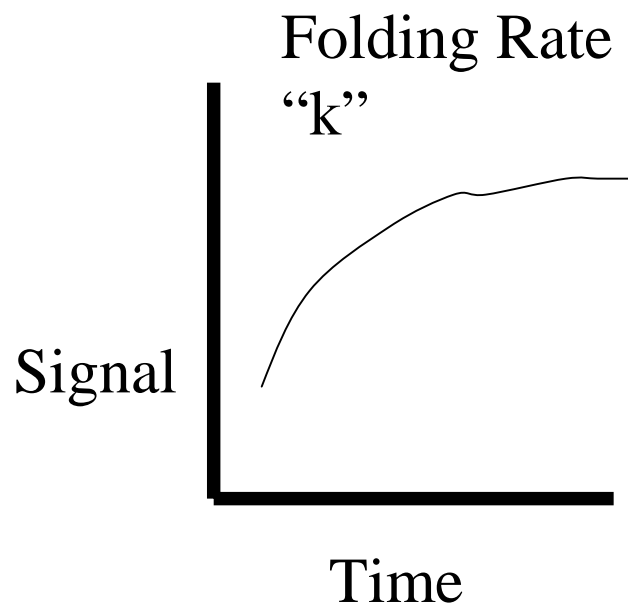


Protein Folding - Methods

Procedure:

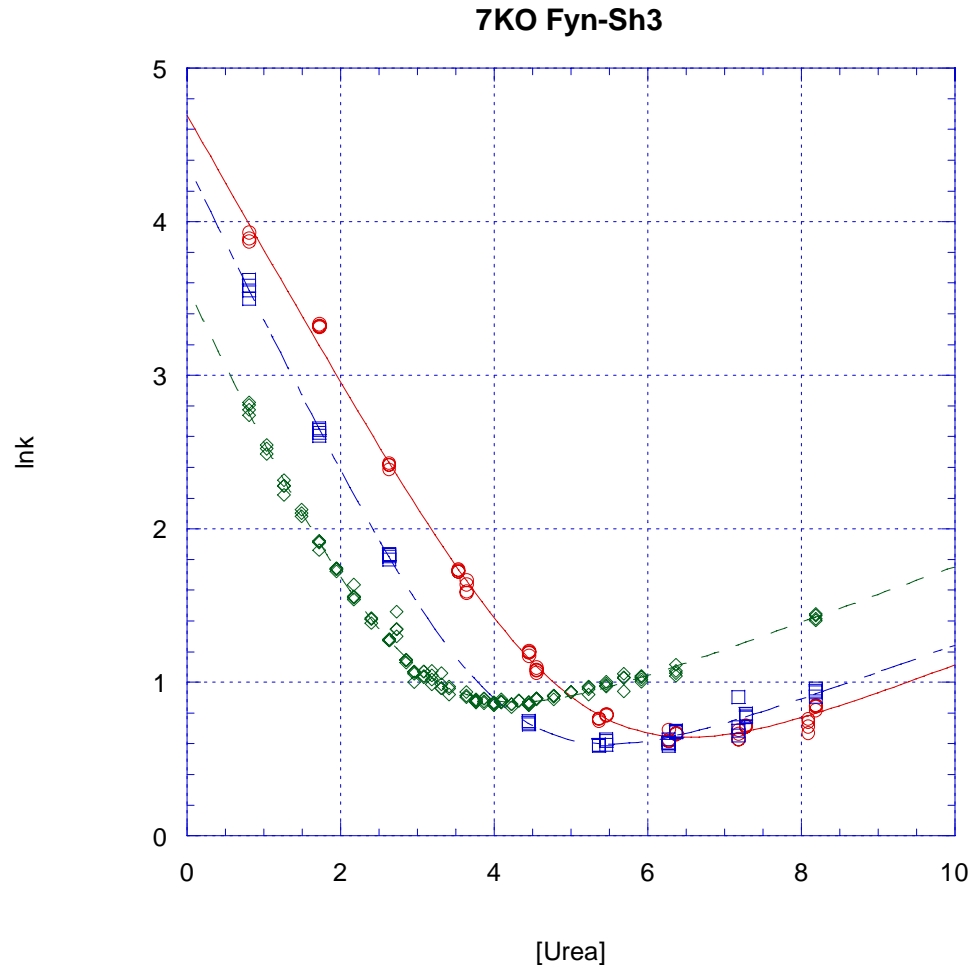
- Make sample conditions
- Prepare sample protein 7KO Fyn-Sh3
- Set-up Stop flow Fluorimeter equipment
- Conduct experiment
- Collect data (Fluorescence signal vs. Time)
- Fit data to obtain folding rates

Protein Folding - Methods



Protein Folding - Results

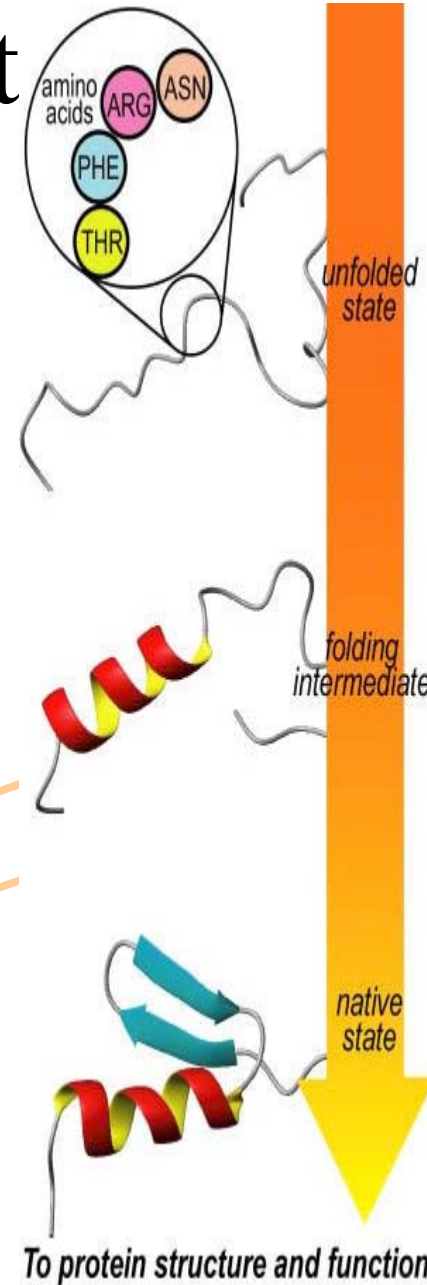
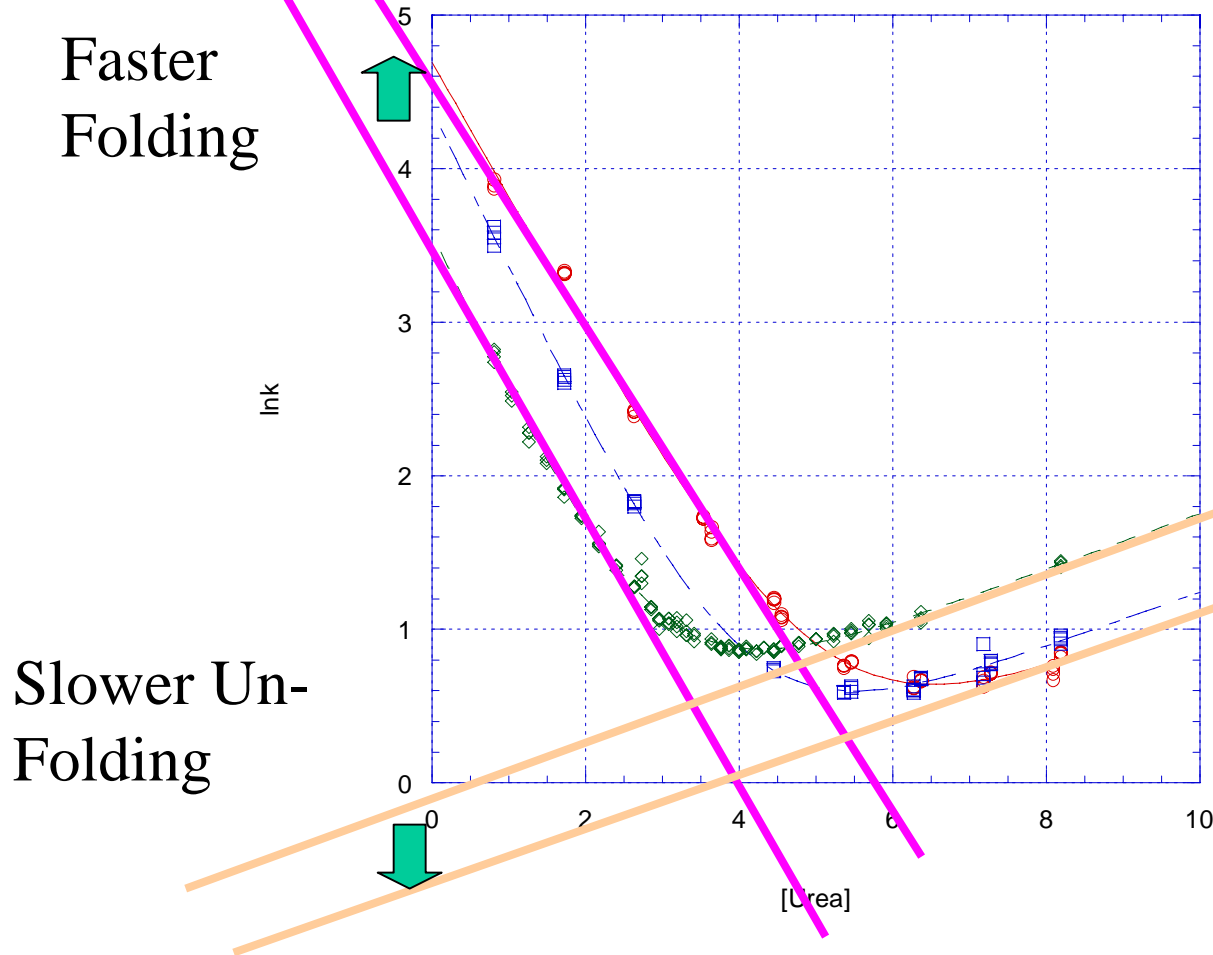
7KO Sh3
7KO Sh3 1M KBr
7KO Sh3 0.5M NaCl



Protein Folding - Result

7KO Sh3
7KO Sh3 1M KBr
7KO Sh3 0.5M NaCl

7KO Fyn-Sh3



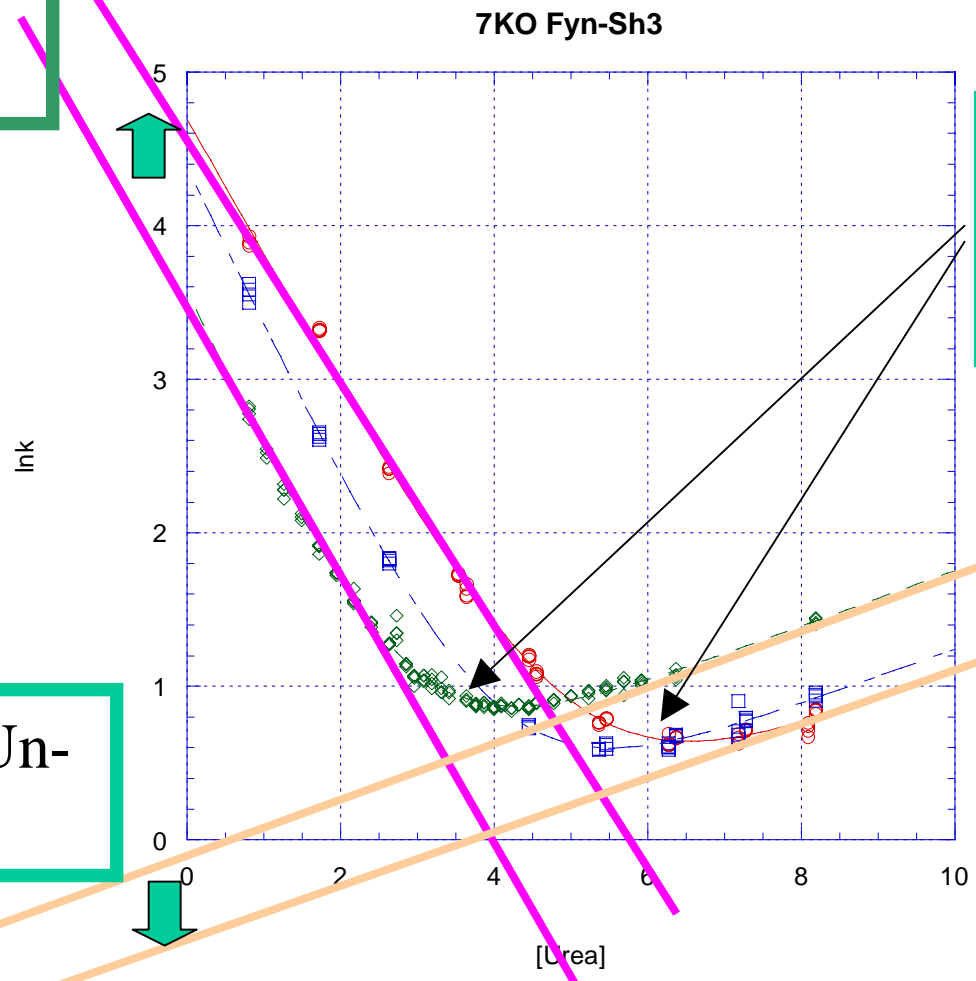
Protein Folding - Conclusions

7KO Sh3
7KO Sh3 1M KBr
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Faster Folding

Stabilization of the Transition Species

Slower Un-Folding



Protein Folding - Conclusions

- Suggested Models: (Ranked)
 1. Proteins favor the folded state
– charged amino acids distribute on the exterior of the folded protein
 2. Ions create disruptive repulsive forces speeding folding
 3. Ions create disruptive repulsive forces slowing folding
 4. Ions have no effect

RET Experience Conclusions

- Scientific
 - Interdisciplinary nature
 - Application vs. Fundamental Research
 - Skill set/modes of thinking needed
- Personal
 - Refueled
 - Retooled
 - Reignited

*What are our future plans for
translating this research
experience into classrooms?*

Vorakarn Chanyavanich

Ralph Reid Jr.

Culture of Science

- Literacy – content and acquisition
- Language – content and syntax
- Patterns of Thought – question, learn, model
- Practice – design and conduct experiments
- Participants – students, researchers
- Pipeline – HS, B.S, M.S., PhD.

Why the leaky pipeline?

- Isolated disciplines
- Opportunities for exposure
- Qualities of experience
- Barriers to entry

Proposal for Improving the Pipeline

- Integrated science – bio, chem, physics
- Integrated learning – critical thinking, questioning, connected perspectives, communicating
- Emphasize cooperative collaboration
- Inclusion – removing barriers to entry, more face to face connections

JUST One Example!

Astrobiology – How do we detect life?

- Integrated science
DNA, polymers, molecules, polarization, electronics
- Integrated learning
student-driven inquiry, long-term project, building skills, connections
- Cooperative collaboration
teamwork dynamics, real science connections, creative problem solving
- Inclusion
active roles, dialogue, buy-in

Concept Map

