

Wheat Gluten and its Viscoelastic Properties

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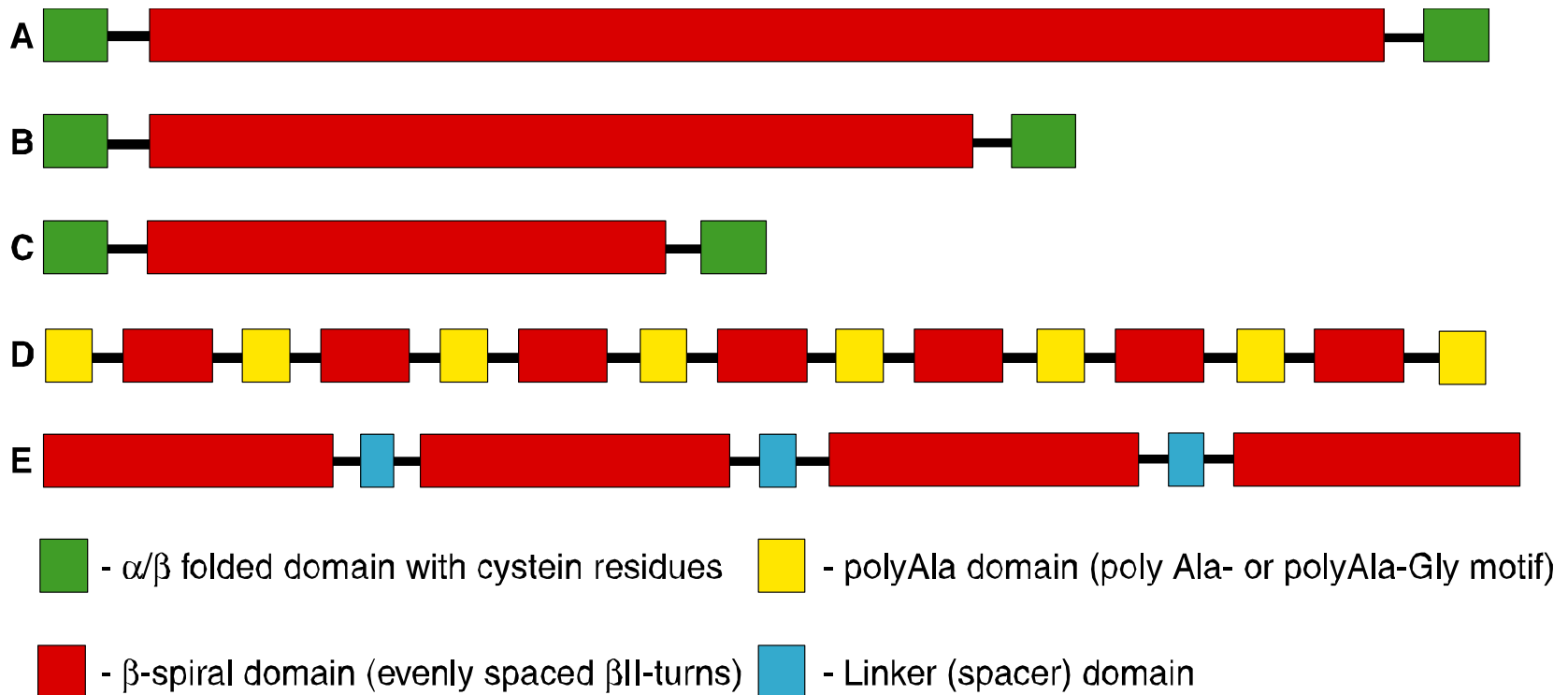
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Wheat Gluten and its Viscoelastic Properties

- Improving bread quality
- Inventing new ways to make adhesives, pants, cosmetics, and detergents
- Interested in making thermoplastic (disposables)

In the even larger picture there are:

- Production of bullet proof armor, tethers and pants



A- HMM glutenins, **B-** Gliadins, **C-** LMM glutenins, **D-** dragline silk proteins, **E-** capture silk proteins

Fig. 1 Schematic representation of structural organization of gluten and spider silk proteins.

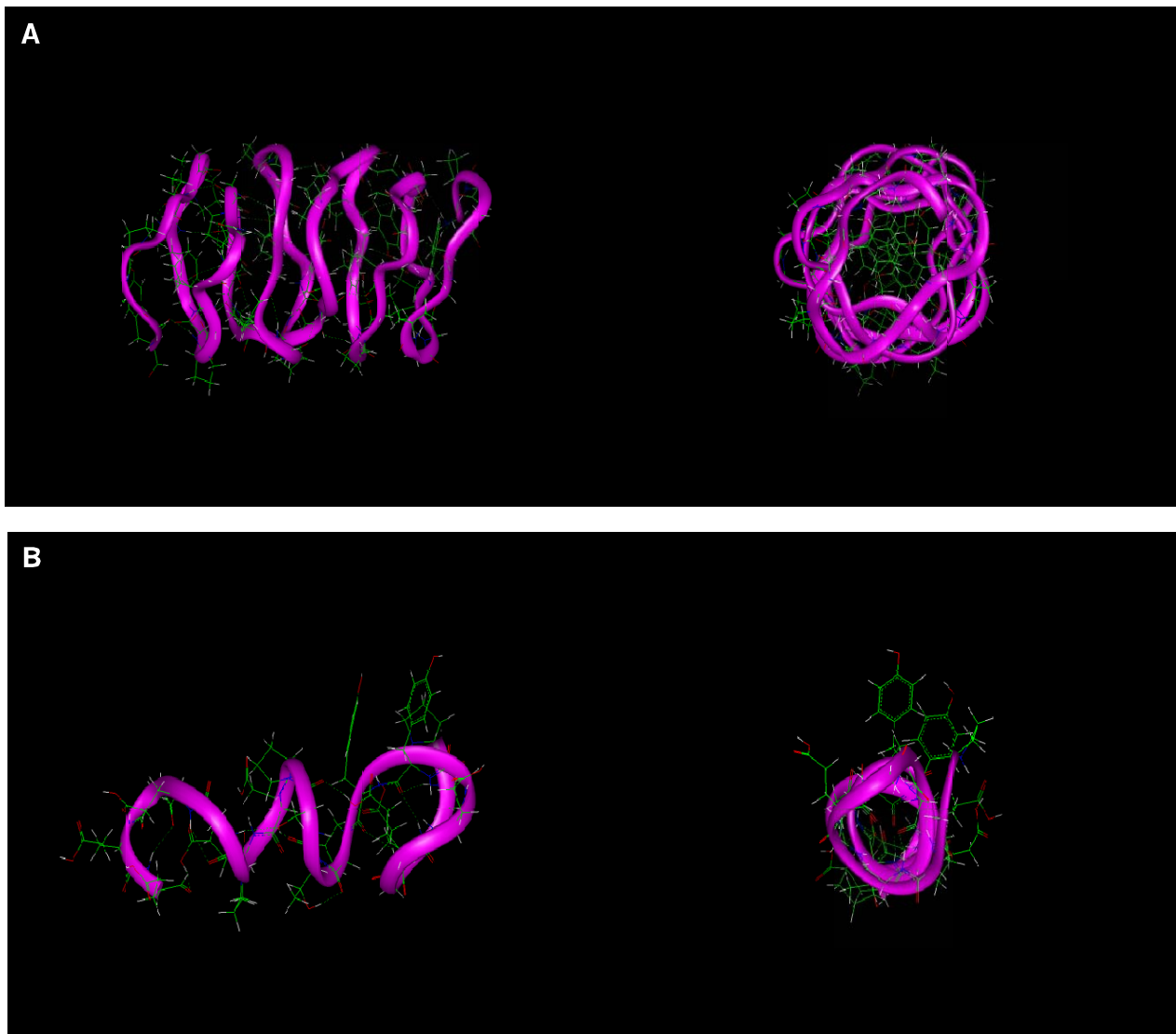


Fig. 2 Molecular models (side and end views) for:

A- capture silk flagelliform protein (sequence (GPGGX)₁₅ where X = Y or V, alternatively).

B- HMM-glutenin protein (sequence PGQQQQGYPTSPQQPGQQQQ)

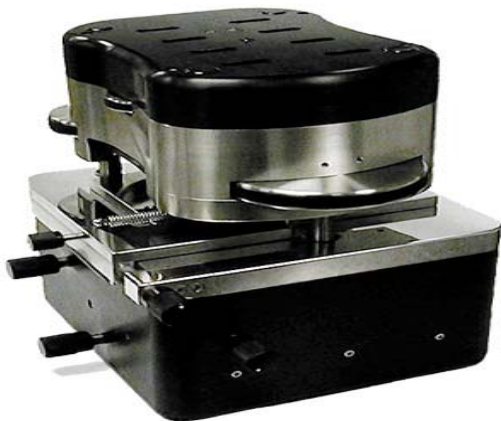
Simulated pulling is in progress, using steered Molecular Dynamics, to investigate the molecular origin of the unique mechanical properties of β -spiral sequences in these proteins.

Making Wheat Gluten Sample

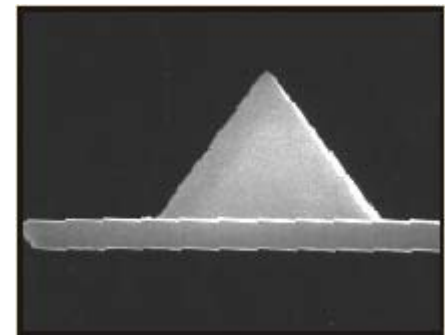
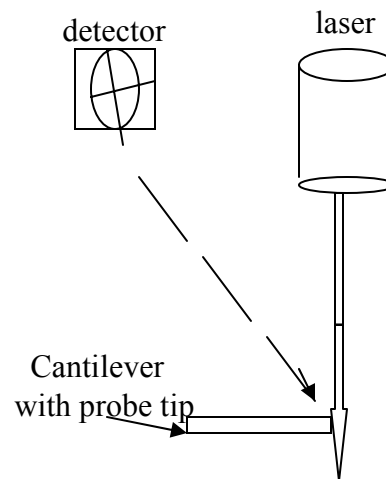
- Ethanol is used to remove Gliadins that are not in the network
- Propanol is used to remove Glutenins that are not in the network
- Propanol and Mercaptoethanol are used to break up the network

Molecular Force Probe

- Laser allows for detection of cantilevers amount of bending
- Detector is used to determine deflection of cantilever
- Piezo crystals are used to control the actual movement of the stage

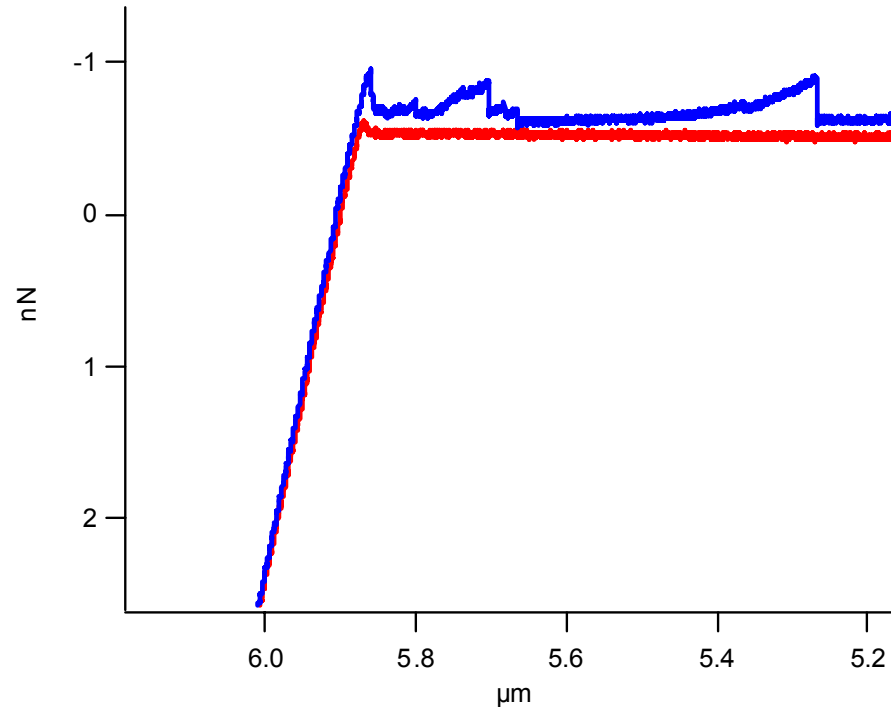


Molecular Force Probe



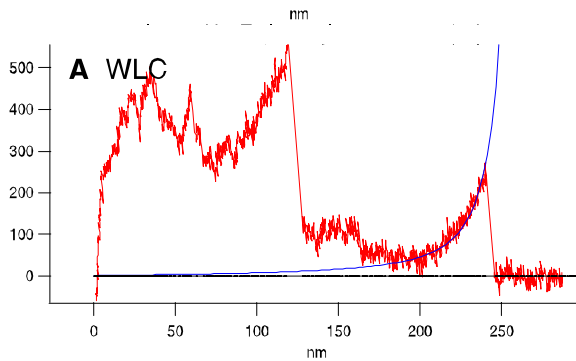
cantilever

Data Collected

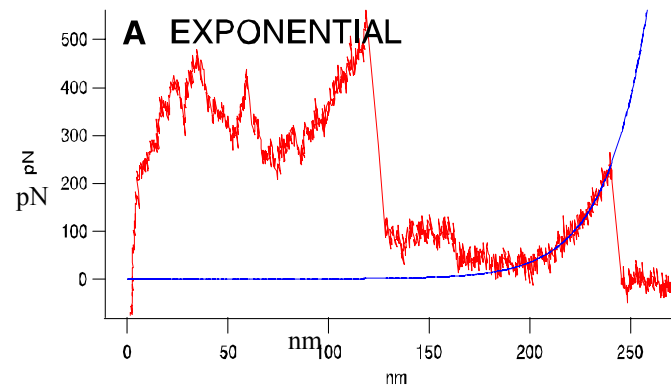


Research Objectives

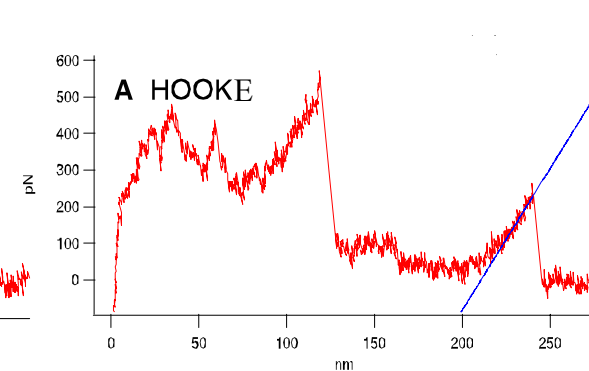
- What component(s) in the wheat gluten structure is responsible for viscoelasticity
- The effect PH solutions have on wheat gluten viscoelasticity
- Comparison of curve models based on data and graphs collected



Worm-like chain model



Exponential model



wave#195 located in: E:gluten:gluten01-28-03(01)extr:

Hooke model

Analysis of Data

